"A CLINICAL STUDY ON THE EFFECTIVENESS OF CONSTITUTIONAL TREATMENT IN THE PROGNOSIS OF PRE-DIABETES BASED ON GLYCATED HEMOGLOBIN".

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IN

PRACTICE OF MEDICINE

By

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UNDER THE GUIDANCE OF

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SUBMITTED TO

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2019

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This is to certify that the Dissertation entitled **"A CLINICAL STUDY ON THE EFFECTIVENESS OF CONSTITUTIONAL TREATMENT IN THE PROGNOSIS OF PRE-DIABETES BASED ON GLYCATED HEMOGLOBIN"** is a bonafide work carried out by **Dr.MAHIMA.S,** a student of M.D.(Hom.) in **DEPARTMENT OF PRACTICE OF MEDICINE** in SARADA KRISHNA HOMOEOPATHIC MEDICAL COLLEGE under the supervision and guidance of **Dr.T.AJAYAN M.D.(Hom.), Prof.& Head, Department of Practice of Medicine** in partial fulfillment of the Regulations for the award of the Degree of **DOCTOR OF MEDICINE (HOMOEOPATHY)** in **PRACTICE OF MEDICINE.** This work confirms to the standards prescribed by THE TAMILNADU DR. MGR MEDICAL UNIVERSITY, CHENNAI.

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DECLARATION

I, **Dr. MAHIMA. S** do hereby declare that this Dissertation entitled **"A CLINICAL STUDY ON THE EFFECTIVENESS OF CONSTITUTIONAL TREATMENT IN THE PROGNOSIS OF PRE-DIABETES BASED ON GLYCATED HEMOGLOBIN"**is a bonafide work carried out by me under the direct supervision and guidance of **Dr.T.AJAYAN, M.D(Hom.),** Prof. & Head, Dept. of Practice of Medicine, in partial fulfillment of the Regulations for the award of degree of **Doctor of Medicine(Homoeopathy)** in **PRACTICE OF MEDICINE** of The Tamil Nadu Dr. MGR Medical University, Chennai. This has not been submitted in full or part for the award of any degree or diploma from any University.

Place: Kulasekharam **Dr. MAHIMA. S**

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ABSTRACT

Pre-diabetes is a condition between normal and diabetic stage. Pre-diabetes can take a long time to transform finally as diabetes. It has been generally observed that pre-diabetes will eventually convert to diabetes but, at the same time, there are greater possibilities to revert back to normal, if taken care seriously. The aim of this study is to decrease the risk of type-2 diabetes by reducing the blood sugar level, evidenced by HbA_{1c} value with Homoeopathic constitutional treatment.

METHODS

This study was undertaken at Sarada Krishna Homoeopathic Medical College Hospital & peripheral centres. 30 patients with a positive family history, physique and sedentary life style were selected randomly and HbA_{1c} levels were estimated both before and after treatment and were analysed to evaluate the role of Constitutional treatment in case of pre-diabetes. HbA_{1c} level is estimated after a 3 months period of treatment.

RESULT

Result shows that most of the pre-diabetic patients belong to the age group of 50-55 years of which, men are mostly affected. Out of 30 cases, 27 cases showed improvement in the HbA_{1c} value.

CONCLUSION

The study shows that Homoeopathic constitutional treatment is effective to check the progression of pre-diabetes to diabetes.

KEY WORDS: Pre-diabetes, HbA_{1c}, Constitutional Treatment

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Dr. MAHIMA .S

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS USED

Sl No.	ABBREVIATION	EXPANSION
1	%	Percentage
2	<	Aggravation
3	>	Amelioration
4	D	Dose
5	Dr	Doctor
6	F	Female
7	M	Male
8	No.	Number
9	OPD	Outpatient department
10	IPD	Inpatient department
11	Yrs	Years
12	i.e.,	That is
13	eg.	Example
14	&	And
15	/	Or
16	IFG	Impaired Fasting glucose
17	IGT	Impaired Glucose Tolerance

LIST OF APPENDICES

1.0 INTRODUCTION

Diabetes is a major health problem all over the world. Its prevalence varies in different populations, being very high to the extent of 40% of all those above the age of 15 years in India, 34% in Micronesians particularly Naura, and in migrant Indians in South Africa, Fiji, UK and USA. It is low in Eskimos, tribes in India and primitive populations of Africa. The prevalence of Diabetes is likely to double itself during the next few years. Because of this high prevalence, much attention has been given to the prevention, beginning with identifying at – risk individuals prior to diagnosis. This has led to the designation of PRE-DIABETES, which is an intermediate form of dysglycemia on a spectrum ranging from normal to overt diabetes.

In pre-diabetes, blood sugar levels are slightly higher than normal, but still not as high as in diabetes. If diabetes is " runaway blood sugar" , pre-diabetes is blood sugar which is " halfway out the door." Pre-diabetes usually occurs prior to the development of Type 2 Diabetes. The rise in blood sugar level in pre-diabetes starts when the body develops insulin resistance.

Once insulin resistance begins, it can worsen over time. In pre-diabetes extra insulin is produced in the body to maintain the blood sugar level near to normal. Insulin resistance worsens as age advances and as the body gain weight. When the insulin resistance progress, eventually the body cannot compensate the extra insulin production. When this occurs, the blood sugar level will increase, which will result in Diabetes.

Pre-diabetes can be more specifically called " Impaired Glucose Tolerance" or " Impaired Fasting Glucose." The same blood sugar tests that are used for diabetes are used to diagnose pre-diabetes such as Fasting blood glucose test, Oral glucose tolerance test and Glycated hemoglobin test.

American Diabetes Association defines pre-diabetes as a fasting blood glucose of 100 - ≤ 126 mg/dl, a 2-h plasma glucose of 140 - ≤ 200 mg/dl after a 75 g oral glucose tolerance test or HbA1C 5.7% to 6.5%.

HbA1C levels 5.5% to 6.5% are associated with an increased risk of diabetes and cardiovascular disease compared with levels ≤ 5.5% even after adjustment for fasting glucose CVD riskfactors. Because of these associated risks, surveillance of Pre-diabetes allows better prediction of diabetes trends and of the resources that will be required to treat rising diabetes.

1.1 NEED FOR THE STUDY

Before people develop type 2 diabetes, they almost always have Pre-diabetes. Recent research has shown that some long term damage to the body, especially the heart and circulatory system, may already be occurring during Pre-diabetes. People with Pre-diabetes can prevent type-2 diabetes by eating healthy diet, being physically active, and managing their weight. So identifying people with Pre-diabetes is very much important. This study is planned to decrease the risk of type-2 Diabetes & heart disease by reducing blood sugar levels evidenced by HbA1C using Homoeopathic constitutional treatment. Homoeopathy can offer a safe, simple, low cost and effective treatment in preventing type-2 diabetes. The dominant school of medicine provides various pharmacotherapeutics

as well as insulin therapy which brings down the blood sugar level, but the chances of developing other systemic disorders due to its prolonged usage is very much high. Prevention is always better than cure. So preventing diabetes by identifying and treating people with Pre-diabetes would always prove better than getting treatment after being diagnosed for diabetes.

2.0 AIMS & OBJECTIVES

- To study the improvement of the patient based on HbA_{1c} levels in patients with pre-diabetes
- To study the history and clinical presentations of individuals diagnosed with pre-diabetes

3.0 REVIEW OF LITERATURE

3.1 PRE-DIABETES

3.1.1 SYNONYM: BORDERLINE DIABETES, CHEMICAL DIABETES, TOUCH OF DIABETES etc.[1]

3.1.2 DEFINITION

Pre-diabetes is defined as a condition in which the blood glucose levels are higher than normal but not high enough to be diagnosed with diabetes.[2] The World Health Organization (WHO) has defined pre-diabetes as a state of intermediate hyperglycemia using 2 specific parameters, impaired fasting glucose (IFG) defined as fasting plasma glucose (FPG) of 6.1 – 6.9 mmol/L (110 to 125 mg/dL) and impaired glucose tolerance (IGT) defined as 2 hour plasma glucose of 7.8 – 11.0 mmol/L (140 to 200 mg/dL) after ingestion of 75 g oral glucose load or a combination of the two based on a 2 hour oral glucose tolerance test (OGTT).[3]

The ICD-10 code for prediabetes is R73.03.The "R" corresponds to section XVIII, titled, "Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified.""R70-79" correspond to, "abnormal findings on examination of blood, without diagnosis."The "73" indicates, "Elevated blood glucose level."The ".03" indicates, "Prediabetes."[4]

3.1.3 PREVALENCE

The statistics report of the Centres of Disease Control & Prevention National Diabetes suggests that 37% of United States adults older than 20 years are found to be pre-diabetic

defined by fasting glucose or HbA1c levels.[5] The world wide prevalence of IGT in 2010 was estimated to be 343 million ranging from 5.8% in South East Asia to 11.4% in North American and Caribbean Countries of the nation's population. The International Diabetes Federation projects the prevalence of Pre-diabetes to be 471 million of the world population or 8% of the adult population. Prevalence of pre-diabetes is mostly similar to that of diabetes, but somewhat higher in Africa & Europe regions and lower in South-East Asian region.[6]The study results of the first phase study to determine the prevalence of diabetes and pre-diabetes in India shows that the prevalence of pre-diabetes in Tamilnadu is 8.3%, 12.8% in Maharashtra and 8.1% in Jharkhand.[7]

3.1.4 AGE DISTRIBUTION

Most of the people who are found to be pre-diabetic are under the age of 50 years. Among this one third of the pre-diabetic people come under the age group of 20-39 years. If they are left untreated, they are at high risk of progressing to type 2 diabetes in life later.[6]

3.1.5 AETIOLOGY

Exact cause of pre-diabetes is unknown. Family history & genetics appear to play a major role. Inactivity and excess abdominal fat also seem to be an important factor for the development of pre-diabetes.[8]

3.1.6 RISK FACTORS

The risk factors for the development of type 2 diabetes and pre-diabetes are found to be the same. These include:

- OVER WEIGHT: One of the primary risk factor for being pre-diabetic is being over weight (BMI $\geq$ 25 kg/m^2). The excess fat deposition inside and between the muscle and beneath the skin around the abdomen will cause the body cells to be more resistant to the insulin hormone.
- WAIST CIRCUMFERENCE: The chance of developing insulin resistance, increases with increase in waist size. The risk of insulin resistance is high in men with waist circumference larger than 40 inches and in women with waist circumference more than 35 inches.
- DIET: Diet including red meat and processed meat, drinking sugar-sweetened beverages etc. are associated with a high risk of pre-diabetes. A diet rich in fruits, vegetables, nuts, whole grains and olive oil is associated with a lower risk of pre-diabetes.
- PHYSICAL INACTIVITY: Less the physical activity, more the chance to develop pre-diabetes.
- AGE: Pre-diabetes can develop at any age but the risk increases after the age of 45 years.
- FAMILY HISTORY: Risk is high if an individual is having a first degree relative with type-2 diabetes.
- RACE: Certain races such as African – Americans, Hispanics, Native Americans, Asian – Americans and Pacific Islanders are more likely to develop pre-diabetes.
- GESTATIONAL DIABETES: If a pregnant lady develops gestational diabetes, she and her baby are at high risk of developing pre-diabetes. Mothers who deliver

a big baby (birth weight < 4.1kg) also have an increased risk of developing pre-diabetes.

- PCOS: poly cystic ovarian syndrome increases women's risk of pre-diabetes.
- SLEEP: sleep disorder like Obstructive Sleep Apnea have an increased risk of insulin resistance[8]

3.1.7 PATHOLOGY

The insulin secretion in 24 hours is 30-40 units, 50% of which is secreted in the basal conditions and the remainder is secreted in response to a meal. The secretion of insulin is pulsatile with major pulsation being observed every 1.5 – 2 hours. This frequency of pulsation are present in the basal state and are amplified post prandially. Super imposed on these large amplitude ultradian pulses are more rapid oscillations in the beta activity that occurs at periodicity of 8-16 minutes. The liver responds more favourably to insulin delivered in a pulsatile fashion than insulin delivered in a constant rate. There are also circadian variations in insulin secretion. The maximum secretion occurs after the breakfast when the subject receives three standard meals.[9]

This secreted insulin get circulated in the bloodstream, and it helps in the uptake of sugar present in the blood into the cells and thereby lowers the sugar level in blood. As the blood sugar level drops, the insulin secretion from pancreas also decreases.

Liver acts as glucose storage and manufacturing center. When the insulin levels are low and when a person is in fasting the liver releases stored glucose into the blood, to keep the blood glucose level within a normal range.

In pre-diabetes, this process begins to work improperly. Instead of sugar moving into the cells, it builds up in the bloodstream. [(1)] The cells in the body will not respond normally to insulin. The pancreas secretes more insulin to try to get the cells respond to insulin. Eventually the pancreas cant keep up, and the blood sugar rises, setting the stage of pre-diabetes and type 2 diabetes down the road.[(10)]

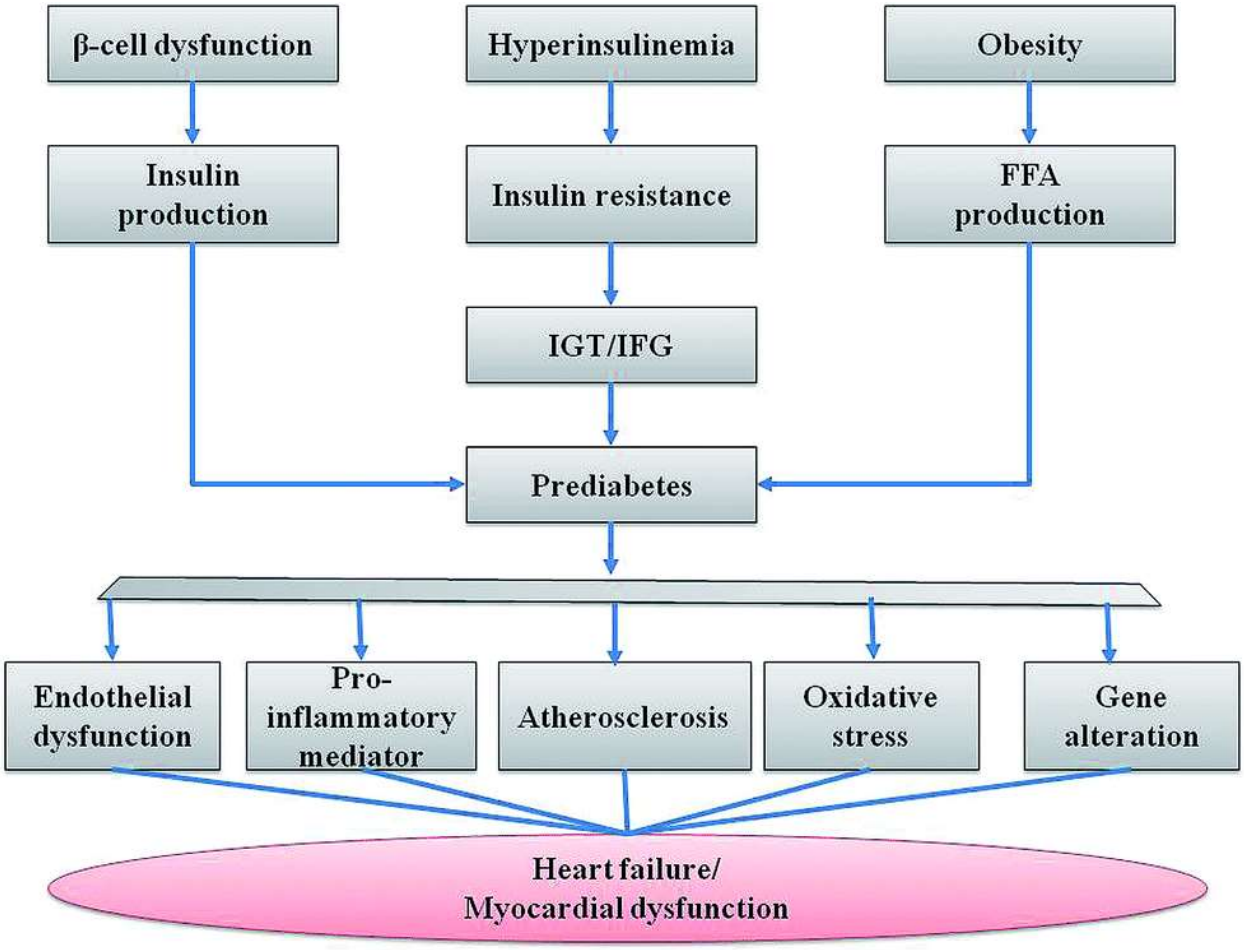


Figure No:1. Pathogenesis of pre-diabetes

3.1.8 CLINICAL FEATURES

Pre-diabetes is often called a "silent" condition because it usually has no symptoms. Pre-diabetes can be present for several years without knowing it.[(11)]

Pre-diabetes can take a long time to transform finally as diabetes. It has been generally observed that pre-diabetes will eventually convert to diabetes but, at the same time, there are greater possibilities to revert back to normal if taken care seriously. People suffering from pre-diabetes may show same symptoms as in diabetes but, only occasionally like:

- Excessive thirst
- Tingling sensations in feet and fingers
- Excess hunger
- Frequent urination
- Irritability
- Frequent infections
- Blurred vision
- Itching of skin[(1)]

Risk factors can increase the chance to have pre-diabetes like:

- Being over weight
- Being 45 years or older
- A family history of diabetes
- Low levels of high-density lipoprotein (HDL) cholesterol
- High triglycerides
- High blood pressure
- A history of gestational diabetes[(11)]

3.1.9 DIAGNOSIS

According to American Diabetes Association, the diagnostic criteria for pre-diabetes is an elevated fasting plasma glucose level (100 mg/dL – 125 mg/dL), a glycated hemoglobin (HbA_{1c}) value of 5.7% - 6.4%, or an elevated plasma glucose level after an oral glucose tolerance test (140 – 199 mg/dL)[12]

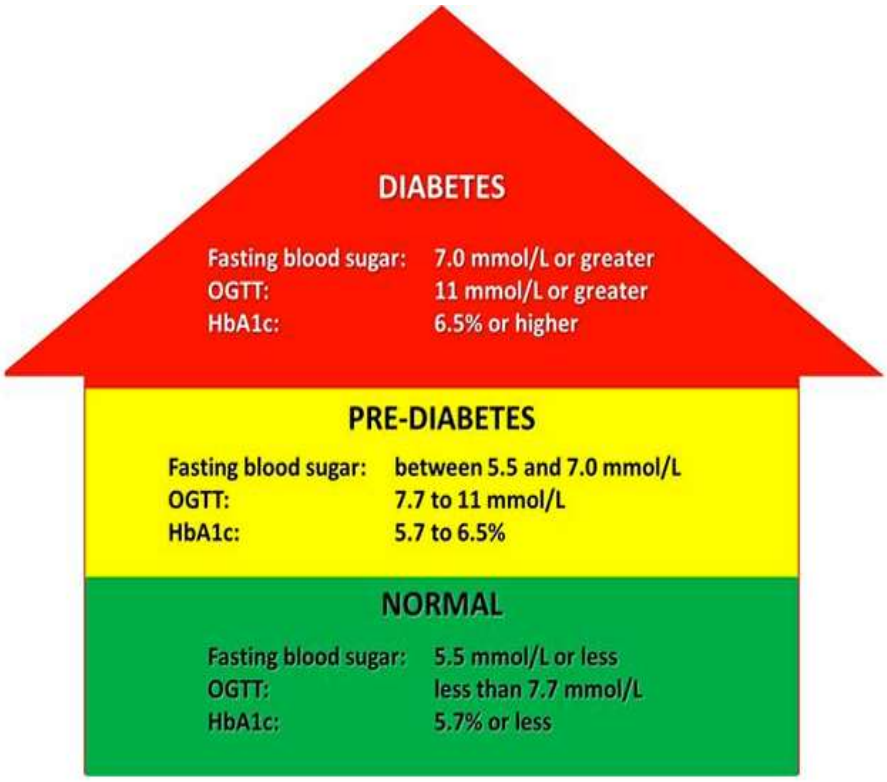


Figure No: 2. Diagnosis of pre-diabetes

AMERICAN DIABETIC ASSOCIATION DIAGNOSTIC CRITERIA FOR NORMAL GLUCOSE, PRE-DIABETES, AND DIABETES [13]

DIABETES TEST	NORMAL	PRE-DIABETES	DIABETES
HbA_{1c} (%)	< 5.7	5.7 – 6.4	≥6.5
FastingBlood Glucose (mg/dL)	<100	100-125	>125
OralGlucose Tolerance (mg/dL)	<140	140-199	>199

Table.1 Diagnostic criteria for pre-diabetes

The American Diabetes Association recommends that diabetes testing start at age of 45 years for all adults who are over weight (BMI ≥ 25kg/m^2) and have any of the following additional risk factors[13]:

- Physical inactivity
- Hypertension or history of cardiovascular disease
- Low levels of HDL cholesterol and high Triglycerides
- First-degree relative with diabetes
- History of previous elevated blood glucose level or HbA_{1c} measurement
- Women with polycystic ovarian syndrome
- History of gestational diabetes or giving birth to a baby weighing more than 4.082 kg
- Member of an ethnic or minority racial group

The same blood sugar test that are used for diabetes, is used for the diagnosis of pre-diabetes also. The tests used are:

- Fasting blood glucose test
- Oral glucose tolerance test
- HbA_{1c} blood test[11]

FASTING BLOOD GLUCOSE TEST

In a fasting blood glucose test, blood sugar levels are measured after atleast 8 hours of fasting. Patients are preferred to have the test done in the morning after fasting overnight.[11]

In general:

- A fasting blood sugar level below100mg/dL is considered to be normal.
- A fasting blood sugar level from 100 – 125 mg/dL is considered pre-diabetes. This is called IMPAIRED FASTING GLUCOSE (IFG)
- A fasting blood sugar level of 126 mg/dL or higher indicates type 2 diabetes[7].

ORAL GLUCOSE TOLERANCE TEST

If the fasting plasma glucose level is less than 126 mg/dL, then a standard oral glucose tolerance test should be done. Inorder to optimize insulin secretion and effectiveness, especially when patients have been on a low-carbohydrate diet, a minimum of 150 – 200 g of carbohydrate per day should be included in the diet for 3 days preceding the test. The patient is asked to eat nothing after midnight prior to the test day. On the morning of the test, the patient is given with 75 g of glucose in 300 mL of water. The glucose load is

consumed within 5 minutes. The test should be performed in the morning, inorder to avoid the diurnal variation in oral glucose tolerance and the patient should not smoke and must be active during the test.

Blood samples are obtained at 0 and 120 minutes after ingestion of glucose. An oral glucose tolerance test is normal if the fasting venous plasma glucose level is less than 100 mg/dL and the 2 hour glucose level falls below 140 mg/dL. A patient with 2 hour value of plasma glucose in between 140-199 mg/dL, is considered to be Pre-diabetic and is called IMPAIRED GLUCOSE TOLERANCE (IGT). False positive results may occur in patients who are malnourished, bedridden, or afflicted with an infection or severe emotional stress.[14]

The usefulness of IFG and IGT in the diagnosis of diabetes and pre-diabetes have been challenged due to inability of these blood glucose cut points to capture the pathology related to pre-diabetes and probability of developing diabetes in future.[15]These cut off levels are not credible due to the poor reproducibility of these test in adults and children.[16] Several studies show poor correlation between HbA_{1c} and IFG and IGT. HbA_{1c} represent an average blood sugar level and will represent hyperglycemia more accurately than other methods. HbA_{1c} is determined by genetic factors, does not depend on blood glucose levels and so it is an imprecise tool to measure average blood sugar.[17]

GLYCATED HEMOGLOBIN (HbA_{1c})

Measurement of glycated hemoglobin is the standard method for assessing long-term glycemic control. When plasma glucose is consistently elevated, there is an increase in

non enzymatic glycation of hemoglobin. This alteration reflects the glycemic history over the previous 2-3 months as the lifespan of erythrocytes is 120 days.[18]

In normal individuals a small proportion of hemoglobin combines with the circulating blood glucose (glycated hemoglobin). This can be separated into 3 types: HbA_{1a}, HbA_{1b} and HbA_{1c} to which more binding happens.[19]

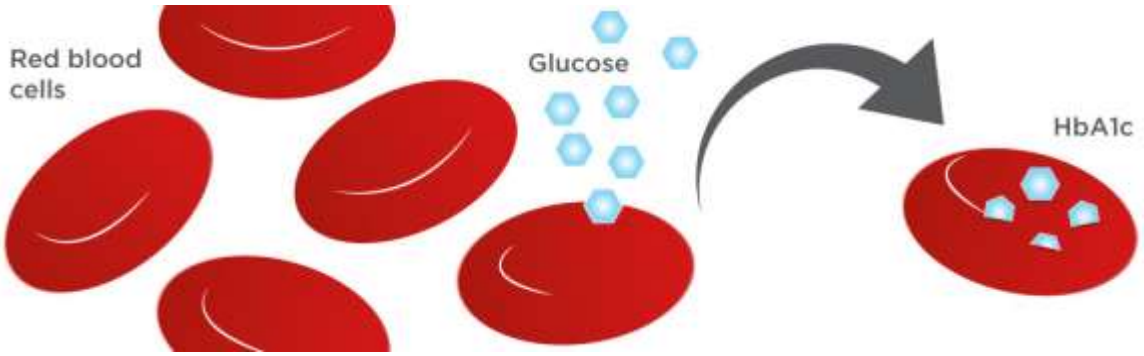


Figure No:3. Glycation of hemoglobin

Hemoglobin becomes glycated by ketoamine reactions between glucose and other sugars and the free amino groups on the alpha and beta chains. Only glycation of the N-terminal valine of the beta chain imparts sufficient negative charge to the hemoglobin molecule to allow separation by charge dependent techniques. These charge separated hemoglobins are collectively referred to as hemoglobin A_1 (HbA_1). The major form of HbA_1 is hemoglobin A_{1c}, where glucose is carbohydrate. HbA_{1c} comprises 4-6% of total hemoglobin A_1. HbA_{1c} is elevated in hyperglycemic states.

The glycohemoglobin circulate within the red blood cells whose life span lasts up to 120 days, it reflects the state of glycemia over the preceding 8-12 weeks, thereby providing an improved method of assessing diabetic control. There is a linear relationship between the HbA_{1c} and the average glucose levels in the previous 3 months.[14] The rate of formation

of HbA_{1c} is directly proportional to the ambient blood glucose concentration. A rise in 1% in HbA_{1c} corresponds to an approximate average increase of 2 mmol/L (36 mg/dL) in blood glucose. Although HbA_{1c} concentration reflects the integrated blood glucose control over the lifespan of erythrocytes (120 days), HbA_{1c} is most sensitive to changes in glycaemic control occurring in the month before measurement.[20]

The accuracy of HbA_{1c} values can be affected by hemoglobin variants; the effect depends on the specific hemoglobin variant and the specific assay used. Any condition that shortens erythrocyte survival or decrease mean erythrocyte age will falsely lower HbA_{1c} irrespective of the assay method used.

HbA_{1c} is endorsed by the ADA as a diagnostic test for type 1diabetes,pre-diabetes and type 2 daibetes. There is no need to fast to test HbA_{1c} and this is considered to be an advantage of using HbA_{1c}. the other advantage of HbA_{1c} is that it has lower intraindividual variability than the fasting glucose test and orla glucose tolerance test and also provides an estimate of glucose control for the preceding 2-3 months. People with HbA_{1c} levels of 5.7 – 6.4% should be considered at high risk for developing diabetes ie pre-diabetes.[14]

3.1.10 COMPLICATIONS

The most serious complication of pre-diabetes include:

- Progression to diabetes
- Nephropathy and kidney diseases
- Neuropathy
- Retinopathy

- Macrovascular disease

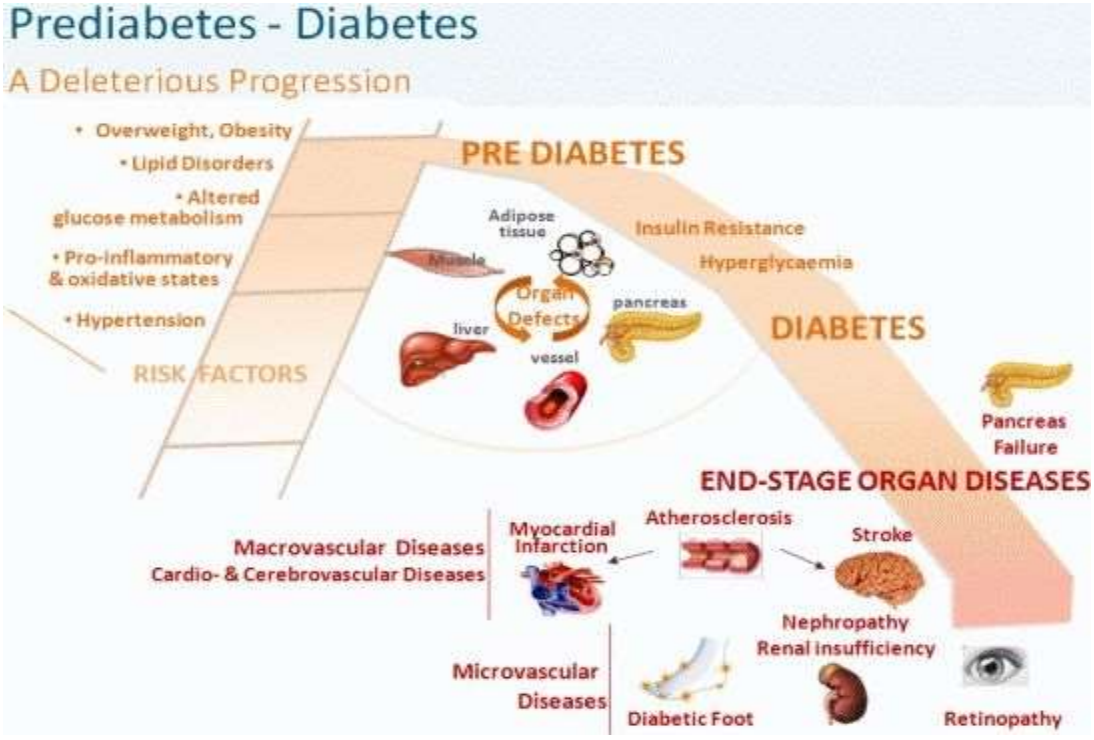


Figure No:4. Complications of pre-diabetes

PROGRESSION TO DIABETES

In a meta-analysis evaluating the progression of pre-diabetes to diabetes published in 2007, the annual incidence rate of diabetes was found to be 4%-6% for isolated IGT, 6%-9% for isolated IFG and 15%-19% for both IGT and IFG.[21] In the United States Multi-Ethnic study of Atherosclerosis the annual incidence of diabetes in IFG group slightly above 4%.[22]

NEPHROPATHY & KIDNEY DISEASE

Based on several studies it is found that there is an association of increased risk of chronic kidney disease and early nephropathy with pre-diabetes.[23] The exact relationship is not clear and it can be due to increased incidence of diabetes in this group or the

presence of other factors associated with both hyperglycemia and nephropathy rather than the effect of pre-diabetes.[24,25]

RETINOPATHY

In the Diabetes Prevention Program (DPP) study, about 8% of participants with pre-diabetes were found to have evidence of diabetic retinopathy.[26] Eventhough pre-diabetes has been associated with an increased risk of diabetic retinopathy, some studies show variations depending on the method used for detection.[27]

MACROVASCULAR DISEASES

Pre-diabetes is associated with increased risk of developing macrovascular diseases. But it remains unclear whether this increased risk is due to pre-diabetes itself or due to development of diabetes.[28,29]

PRE-DIABETES AND CARDIOVASCULAR DISEASE

In a population based study of diabetes and CVD in Mexican Americans and non-Hispanic Whites, those with pre-diabetes who later developed diabetes were found to have an increased atherogenic pattern of risk factors compared to those who did not develop diabetes. An atherogenic pattern of risk factors was defined as increased levels of total and low-density lipoprotein (LDL) cholesterol, triglyceride, blood pressure, glucose, insulin, and lower levels of high-density lipoprotein (HDL) cholesterol. The data also suggested that obesity, hyperglycemia and hyperinsulinaemia are characteristic of pre-diabetes. [30]

3.1.11 MANAGEMENT

Healthy lifestyle choices is the only way to revert back pre-diabetes and to check the advancement of pre-diabetes to type-2 diabetes. Some of the ways that can be adopted for this purpose has been mentioned here:

- ENHANCE PHYSICAL ACTIVITY: Physical activity help the muscles to take up blood glucose as it is essential for energy. Exercise make the cells more sensitive to insulin. The DPP suggests that people who follow a low-fat, low-calorie diet and who engage in physical activities atleast for 30 minutes, five times a week, have a far smaller risk of developing diabetes than people who do not exercise regularly.
- MAINTAIN A HEALTHY DIET: The DPP emphasize the importance of low-calorie and low-fat diet. Following a low-calorie, low-fat diet can provide two benefits. In case of people who are over weight, it helps in limiting calorie and fat intake and thereby help to loose weight. Those who loose weight were far less likely to develop diabetes than any others who remained at a unhealthy diet.

  Increasing physical activity and following a low-calorie, low-fat diet help to bring down the blood pressure and cholesterol level and has many other health benefits.

- HEALTHY CHOICES OF FOOD: The selection of right type of food is extremely important to reverse pre-diabetes. It is advised to consume food with low calories and low fat and on the other side, fresh fruits and vegetables with lots of anti-oxidants should be preffered.

- MAINTAIN IDEAL BODY WEIGHT: The persons who are over weight may develop more complications in the maintenance of normal blood sugar level and so it is advised to maintain ideal body weight. Reducing body weight help to keep pre-diabetes from worsening and developing into type-2 diabetes.
- AVOID SMOKING: Apart from increasing the risk of cancer and cardiovascular disease, smoking also contribute to insulin resistance. So avoid smoking is very much important to revert back pre-diabetes.
- LIFE STYLE MODIFICATION: Persons with less physical activity and sedentary life are at the risk of falling to pre-diabetic. The best way to keep active is by walking, using stairs as far as possible and spending daily 30 minutes for some specific exercise like yoga.[1]

3.1.12 HOMOEOPATHIC APPROACH TO PRE-DIABETES

Homoeopathy can definitely help in cases of pre-diabetes and prevent progression to type-2 diabetes. Homoeopathic treatment is constitutional and is based on the principle that disease is a total affection of body. Moreover, Homoeopathy recognizes the root cause of the condition such as genetic and inherited factors. The Homoeopathic medicines prescribed on such footings play a crucial role in the management of many deep rooted, chronic, complicated diseases. Homoeopathy can be a major player in the prevention of diabetes. Timely administered Homoeopathic medicines not only correct the levels of sugar, protein and fat metabolism, but also helps in preventing further progress and hence complications of the disease.[1]

Homoeopathy treats the patient as a whole. Our master Dr. Samuel Hahnemann has mentioned about this concept in the fifth aphorism of Organon of Medicine.

5th aphorism: "Useful to the physician in assisting him to cure are the particulars of the most probable *exciting cause* of acute disease, as also the most significant points in the whole history of the chronic disease, to enable him to discover its *fundamental cause*, which is generally due to a chronic miasm. In these investigations, the ascertainable physical constitution of the patient (especially when the disease is chronic), his moral and intellectual character, his occupation, mode of living and habits, his social and domestic relations, his age, sexual function, etc., are to be taken into consideration,"(31)

Our philosopher, Dr. Richard Hughes says that understanding a human being and what ails him will ever remain the most difficult task confronting the physician. We have learnt that the remedy will be known to us through the individual features of the case as against the group features that enable us to diagnose the clinical condition. Our chief concern during case receiving, therefore, will be to bring out this individuality which is made known to us through the chief complaint, concomitants, and the type of individual afflicted.(32)

During the process of remedy selection, a Homoeopath tries to individualise the patient based on his physical built, his morality, social behavior, his desires and aversions in common etc. Every person inherits some characters or tendencies from his parents and some tendencies he acquires from his surroundings that constantly influences him. So constitution is the aggregate of the external and internal characters of an individual. In Homoeopathy, the nature of the patient is judged by his temperament, heredity,

predisposition, miasms and constitutional diathesis and the present condition of body and mind. The method of constitutional treatment is unique to Homoeopathy. It is believed that the constitutional medicine can correct the inherent and acquired defects in the personality. Well selected deep acting Homoeopathic remedy is equal to the constitutional remedy.[33]

Genetic factors play an important role in diabetes, especially in type-2. Literature indicate that most cases of diabetes involve many genes, with each being a small contributor to an increased probability of becoming a type-2 diabetic. As of 2011, more than 36 genes have been found to contribute to the risk of type-2 diabetes.

Miasm is known as homoeopathic genetics. Hahnemann has identified and illustrated how different miasms increase proneness to certain set of diseases and how to prevent them with the tool of anti-miasmatic treatment. Diabetes and pre-diabetes has a mixed miasm. Recent works on miasms have led to establishment of mixed miasms and few more new miasmatic traits such as tubercular, cancer etc. The predominant miasm changes with the stage of the disease, body constitution, lifestyle, food habits, etc. identifying the predominant miasm and using need based drug as inter-current along with a healthy diet, exercise and lifestyle may possibly push away or postpone the onset of diabetes.[34]

CONSTITUTIONAL MEDICINES USED IN THE STUDY:

1. **SULPHUR**

- Adapted to persons of scrofulous diathesis, subject to venous congestion, especially of portal system.

- Persons of nervous temperament, quick motioned and quick tempered, skin excessively sensitive to atmospheric changes.
- Lean, stoop shouldered persons who walk and sit stooping; walk stooping like old men.
- Dirty, filthy people, prone to skin affections
- Too lazy to rouse himself; too unhappy to live**,** Rag philosopher
- Complaints that are continuously relapsing
- Standing is the worst position
- Sensation of burning[35]

2. LYCOPODIUM CLAVATUM

- For persons intellectually keen, but physically weak; upper part of body emaciated, lower part semi dropsical.
- Ailments from fright, anger, mortification or vexation with reserved displeasure.
- Avaricious, greedy, malicious
- Irritable; peevish and cross on waking
- Easily angered, cannot endure opposition or contradiction
- Very sensitive, even cries when thanked
- Deep-seated, progressive, chronic diseases[35]

3. CALCAREA CARBONICA

- Psoric constitution; pale, weak, timid, easily tired when walking
- Disposed to grow fat

- Fears she will lose her reason or that people will observe her mental confusion.
- Profuse perspiration especially on back of head and neck, or chest and upper part of body.
- Diseases arising from defective assimilation[35]
- Scrofulous constitution who take cold easily with increased mucoid secretion.[36]
- A jaded state, mental or physical, due to over work.[36]

4. FLOURICUM ACIDUM

- Complaints of old age, or of premature old age; in syphilitic mercurial dyscracia; young people looking old.
- Increased ability to exercise without danger; is less affected by excessive heat of summer or cold of winter.[35]

5. NUX VOMICA

- Thin, irritable, careful zealous persons
- Disposed to be quarrelsome, spiteful, malicious; nervous and melancholic
- Hypochondriac: literary, studious persons, who are too much at home, suffer from want of exercise, with gastric, abdominal complaints.
- Over sensitive: to external impression, trifling ailments are unbearable
- Cannot keep from falling asleep in the evening while sitting or reading hours before bedtime, and awakens at 3 am or 4 am; falls into a dreamy sleep at day break
- Alternate constipation and diarrhea[35]

6. PULSATILLA

- Persons of indecisive, slow, phlegmatic temperament
- Easily moved to laughter or tears; affectionate, mild, gentle, timid, yielding disposition
- Weeps easily, feels better by consolation
- Symptoms ever changing[35]
- Thirstless with nearly all complaints[36]
- Seeks open air, feels better there[36]

7. PHOSPHORUS

- Produces a picture of destructive metabolism[36]
- Tall slender persons of sanguine temperament[35]
- Narrow chested with thin transparent skin, weakened by loss of animal fluids with great nervous debility[36]
- Weary of life, full of gloomy forebidings[35]
- Desire to be magnetised[35]
- Restless, moves continually, cannot sit or stand still a moment[36]

8. NATRUM MURIATICUM

- Great emaciation; losing flesh while living well
- For the anemic and cathectic; from loss of vital fluids
- For the bad effects of anger; of grief, fright, vexation, mortification or reserved displeasure

- Awkward, hasty, drops things from nervous weakness
- Marked disposition to weep; sad weeping mood, without cause, but consolation < her troubles[35]
- Emaciation most notable in the neck
- Oversensitive to all sorts of influences.
- Hyperthyroidism, Goitre, Addison's disease, Diabetes[36]

9. ACIDUM PHOSPHORICUM

- Yong people who grow rapidly and who are over taxed, mentally or physically[36]
- Persons of originally strong constitutions, who have become debilitated by loss of vital fluids
- Ailments: from care, chagrin, grief, sorrow, home sickness; sleepy, disposed to weep, night sweats towards morning[35]

10. STAPHYSAGRIA

- Ailments from thwarted pride, envy or chagrin
- Very sensitive to mental impressions; least action or harmless word offends
- Great indignation about things done by others or by himself; grieves about consequences
- Was insulted; being too dignified to fight, subdued his wrath and went home sick, trembling and exhausted
- Sleepy all day, awake all night; body aches all over.[35]

11. ACIDUM NITRICUM

- Thin persons of rigid fibre, dark complexions, black hair and eyes
- Persons suffering with chronic diseases who take cold easily.
- Long lasting anxiety, anguish from loss of his dearest friend; indifference; tired of life
- Great anxiety about his disease; constantly thinking about his past troubles
- Irritable, headstrong, hateful and vindictive, unmoved by apologies.[35]

12. LACHESIS

- Better adapted to thin and emaciated persons tah to fleshy, to those who have been changed mentally and physically, by their illness.
- Climacteric ailments, hot flushes and hot perspiration, burning vertex headache.
- Women who have not recovered from the change of life
- Great loquacity; wants to talk all the time
- Diseases begin on leftside and then progress to the right side
- Great physical and mental exhaustion
- Great sensitiveness to touch[35]

13. ARSENICUM ALBUM

- Depressing, melancholic, despairing, indifferent, anxious, fearful
- Mentally restless but physically too weak to move; cannot rest in any place, changing places continually
- Greater the suffering, greater the anguish, fear of death

- Attacks of anxiety at night driving out of bed
- Great prostration with rapid sinking of vital forces[35]

3.1.13 PREVIOUS STUDIES RELATED TO PRE-DIABETES AND HbA_{1c}

- A study to access the utility of HbA_{1c} for diagnosing diabetes and pre-diabetes among 5395 adults without known diabetes from the National Health and Nutrition Examination Survey (NHANES) 2005-2010. When assessed against diagnoses using both FPG and 2-hr glucose, HbA_{1c} had low sensitivity and high specificity for identifying diabetes and pre-diabetes, which varied as a function of age and race.[37]
- A study conducted in Japan, longitudinal cohort study included 4670 men and 1571 women aged 24-82 years without diabetes at baseline (diabetes was defined as fasting plasma glucose ≥7.0 mmol/L, self-reported clinician-diagnosed diabetes or HbA_{1c} ≥6.5%) who attended Toranomon Hospital (Tokyo, Japan) for a routine health checkup between 1997 and 2003. Participants with a baseline diagnosis of Pre-diabetes according to impaired fasting glucose or HbA_{1c} 5.7% -6.4% or both, were divided into four groups on the basis of baseline diagnosis of pre-diabetes. Rate of progression to diabetes was assessed annually.[38]
- In 2002, Knowler *et al* hypothesized that lifestyle intervention would prevent or delay the development of diabetes. The researchers randomly assigned patients with pre-diabetes to receive a placebo or a lifestyle modification program with the goals of atleast a 7% weight loss and at least 150 minutes of physical activity per week. The participants were of the mean age, 51 years and the BMI was 34 kg/m^2.

The average follow up was 2.8 years. The incidence of diabetes was 11 and 4.8 cases per 100 person-years in the placebo and lifestyle groups, respectively. The lifestyle intervention had more weight loss and greater increase in physical activity than the participants in the placebo group. Further analysis of the study showed that if patients with pre-diabetes received no intervention, diabetes would develop in approximately 37% in 4 years.[39]

4.0 MATERIALS AND METHODS

4.1 STUDY SETTING

Thirty subjects diagnosed with pre-diabetes are selected from the Out Patient Departments or in the In Patient Departments and Peripheral Centres of Sarada Krishna Homoeopathic Medical College Hospital, Kulasekharam based on the inclusion criteria.

4.2 SELECTION OF SAMPLES AND SAMPLE SIZE

Purposively selected 30 diagnosed cases of pre-diabetes (HbA_{1c} 5.7%-6.4%) were taken for the study.

4.3 SAMPLING TECHNIQUE

Purposive sampling technique was used in this study.

4.4 METHODOLOGY

Purposive selection of 30 cases of pre-diabetes from the OPD, IPD and peripheral OPD centres of Sarada Krishna Homoeopathic Medical College Hospital, Kulasekharam. Pre-test was done in the patients presenting with the symptoms of pre-diabetes and based on the patients physique & family history. The case details were recorded in standardized case recording format of Sarada Krishna Homoeopathic Medical College Hospital. Then the cases were analysed and totality was evaluated. Repertorisation was done if needed and a well selected remedy was prescribed based on totality.

4.5 INCLUSION CRITERIA

- Adults in the age group of 20-55 years, both males and females.
- Patients with the clinical presentation of pre-diabetes.
- Persons with a hereditary tendancy to diabetes and with a possible physique.

4.6 EXCLUSION CRITERIA

- People below the age of 20 years and above the age of 55 years.
- Pregnant ladies.
- Patients under other systems of treatment.
- Patients suffering from other systemic diseases.

4.7 STUDY DESIGN

An observational study with Homoeopathic intervention in pre-diabetes assessed by before and after treatment values of $HbA_{1c.}$ Study was conducted in patients who are matching with inclusion criteria after taking the case history, physical examination and investigations.

4.8 INTERVENTION

By means of analyzing the pre-treatment, post treatment clinical changes and HbA_{1c} value, the study is intervened.

4.9 SELECTION OF TOOL

- Standardized case record format
- HbA_{1c} value

- Diagnostic criteria
- RADAR Synthesis 9.1

4.10 BRIEF OF PROCEDURE

By using the personal interviewing technique and standardized case record format of Sarada Krishna Homoeopathic Medical College, data was collected from the patients with the clinical symptoms:

- Screening of patient based on pre-diabetic HbA_{1c} value (5.7% - 6.4%)
- The selected cases were analysed and the totality were framed.

Cases were repertorised using advanced computer software technique, RADAR Synthesis 9.1. Repertorial result was analyzed and prescription was made by the indicated medicine. Finally by observing the symptomatic changes after treatment and by HbA_{1c} value, effectiveness Homoeopathic medicine in the treatment of pre-diabetes was assessed.

4.11 OUTCOME ASSESSMENT

Parameters of the study:

- HbA_{1c}

By observing the changes after treatment in clinical findings and HbA_{1c} values, pre-diabetes was assessed as improved or not improved.

4.12 DATA COLLECTION

Selection of 30 diagnosed cases of pre-diabetes from OPD,IPD and RHC of Sarada Krishna Homoeopathic Medical College. The complaints associated with the disease and family history was recorded from the patient after a detailed case taking session in the general case taking format adopted by SKHMC.

4.13 STATISTICAL TECHNIQUE & DATA ANALYSIS

Hypothesis was analyzed by using the HbA_{1c} levels. Hypothesis was tested using paired 't' test to substantiate the effectiveness of constitutional treatment in pre-diabetic cases.

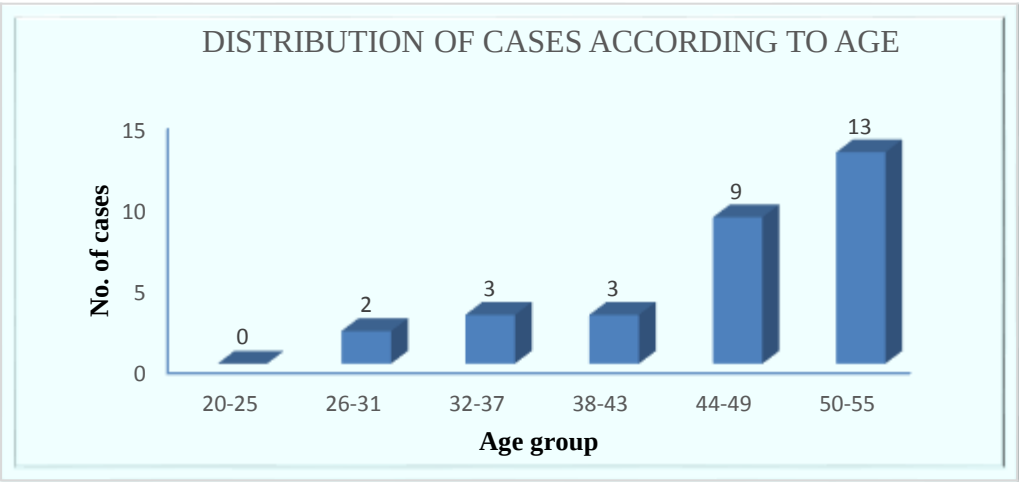
5.0 OBSERVATIONS AND RESULTS

Distribution of cases according to Age

Table. 2. Distribution of cases according to Age

SL.NO	AGE GROUP	NO. OF CASES	PERCENTAGE
1	20-25	0	0%
2	26-31	2	6.67%
3	32-37	3	10%
4	38-43	3	10%
5	44-49	9	30%
6	50-55	13	43.33%

Figure No:5 Distribution of cases according to Age



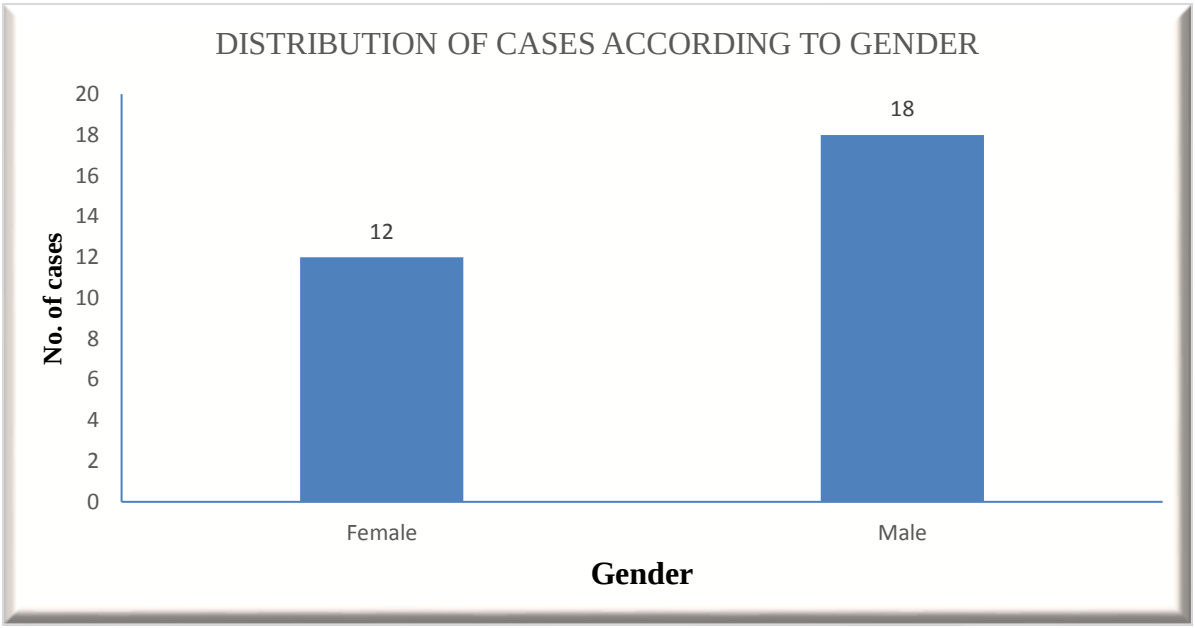
Out of 30 cases maximum number of persons with pre-diabetes fall under the age group of 50-55 years, about 13 cases; 9 persons come under the age group of 44-49, 3 come under the age group of 38-43; 3 people come in the age group 32-37; 2 come under the age group of 26-31 and none of them fall under the age group of 20-25 years.

Distribution of cases according to Gender

Table.3 Distribution of cases according to Gender

SL.NO	Gender	NO. OF CASES	PERCENTAGE
1	Female	12	40%
2	Male	18	60%

Figure No:6 Distribution of cases according to Gender



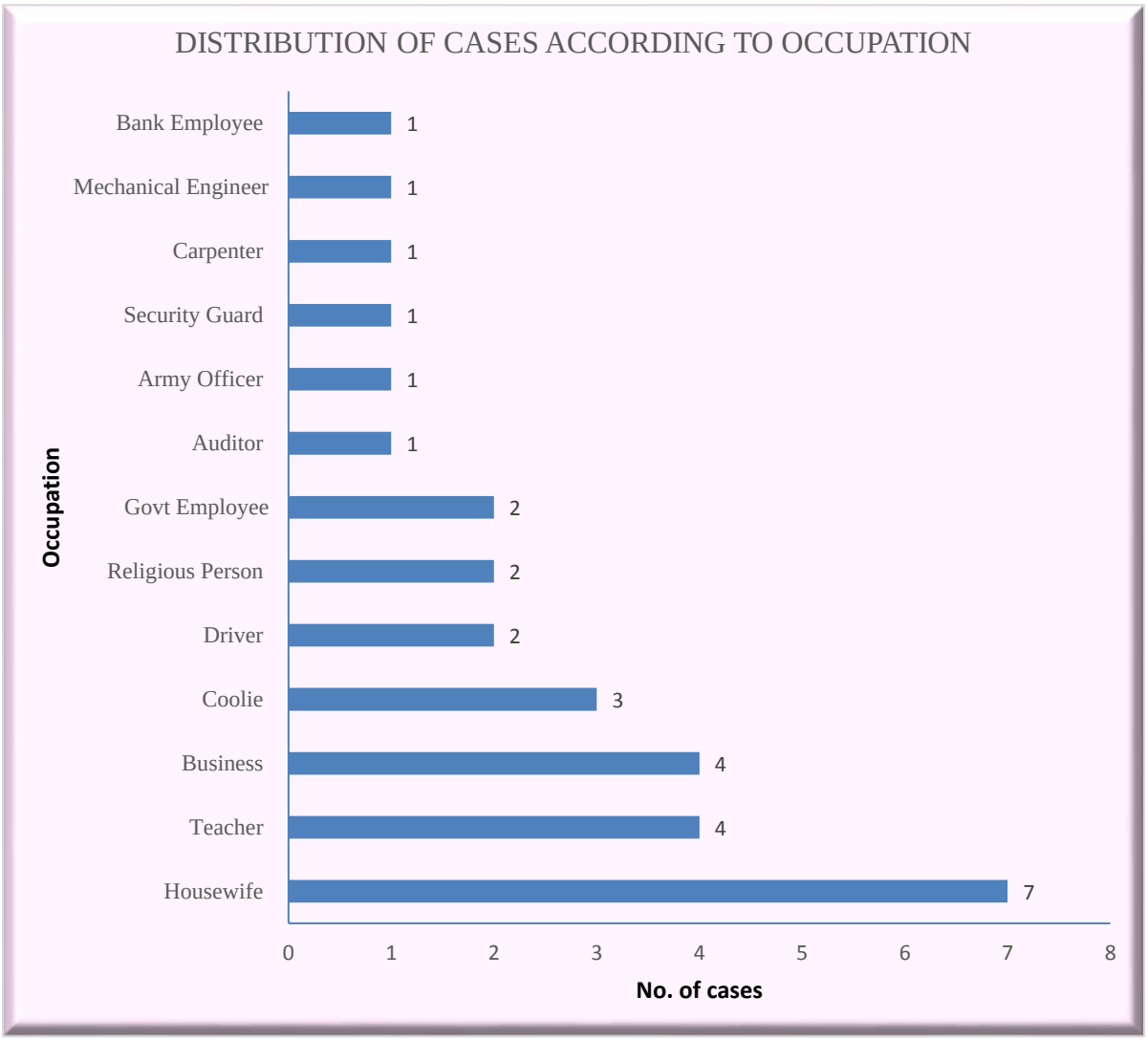
Among the 30 cases, 18 of the patients were males and females were about 12. The study suggests that men are more affected with pre-diabetes.

Distribution of cases according to occupation

Table.4. Distribution of cases according to occupation

SL.NO	OCCUPATION	NO. OF CASES	PERCENTAGE
1	Housewife	7	23.33%
2	Teacher	4	13.33%
3	Business	4	13.33%
4	Coolie	3	10%
5	Driver	2	6.67%
6	Religious Person	2	6.67%
7	Govt Employee	2	6.67%
8	Auditor	1	3.33%
9	Army Officer	1	3.33%
10	Security Guard	1	3.33%
11	Carpenter	1	3.33%
12	Mechanical Engineer	1	3.33%
13	Bank Employee	1	3.33%

Figure No:7 Distribution of cases according to occupation



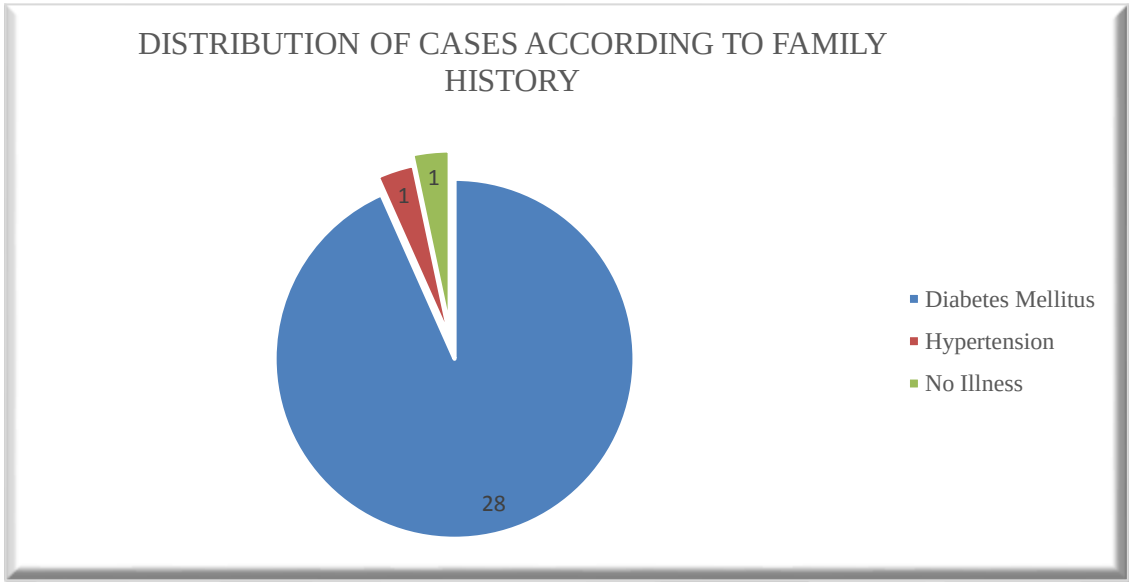
In the study of 30 cases, about 7 persons were housewives; 4 were teachers; 4 were businessmen; 3 coolies; 2 drivers; 2 religious persons; 2 Govt. Employees and auditor, Army officer, Security Gaurd, Carpenter, Mechanical Engineer and Bank employee were 1 in number each.

Distribution of cases according to Family History

Table. 5. Distribution of cases according to Family History

SL.NO	FAMILY HISTORY	NO. OF CASES	PERCENTAGE
1	Diabetes Mellitus	28	93.33%
2	Hypertension	1	3.33%
3	No Illness	1	3.33%

Figure No:8 Distribution of cases according to Family History



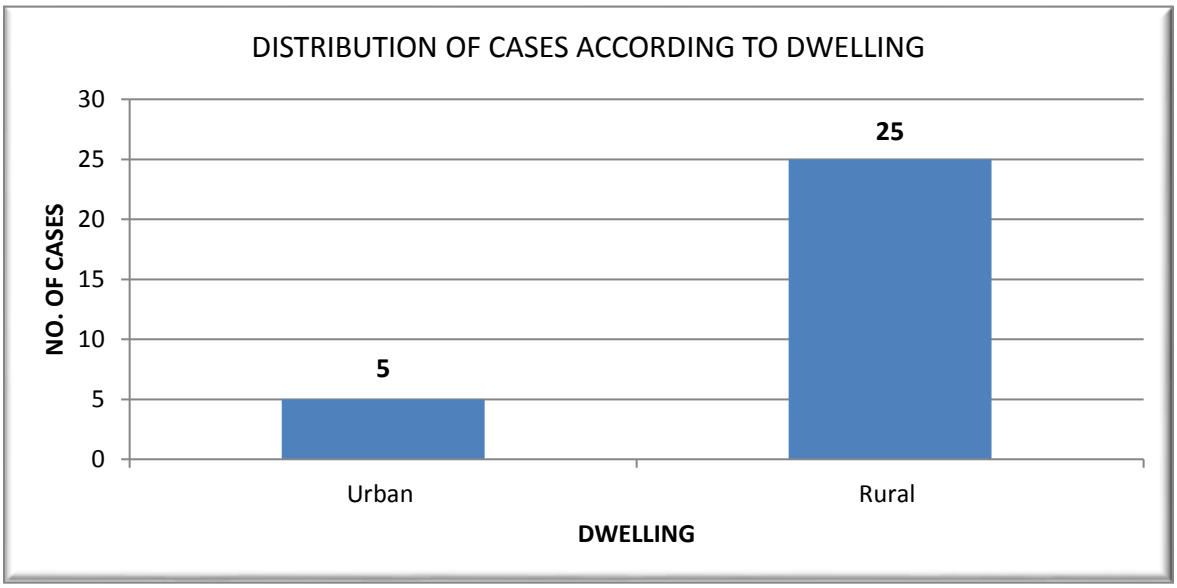
Out of 30 patients, about 28 of them had a family history of Diabetes mellitus, 1 with a family history of hypertension and 1 with no family history.

Distribution of cases according to Dwelling

Table.6 Distribution of cases according to Dwelling

SL.NO	DWELLING	NO. OF CASES	PERCENTAGE
1	Urban	5	16.67%
2	Rural	25	83.33%

Figure No:9 Distribution of cases according to Dwelling



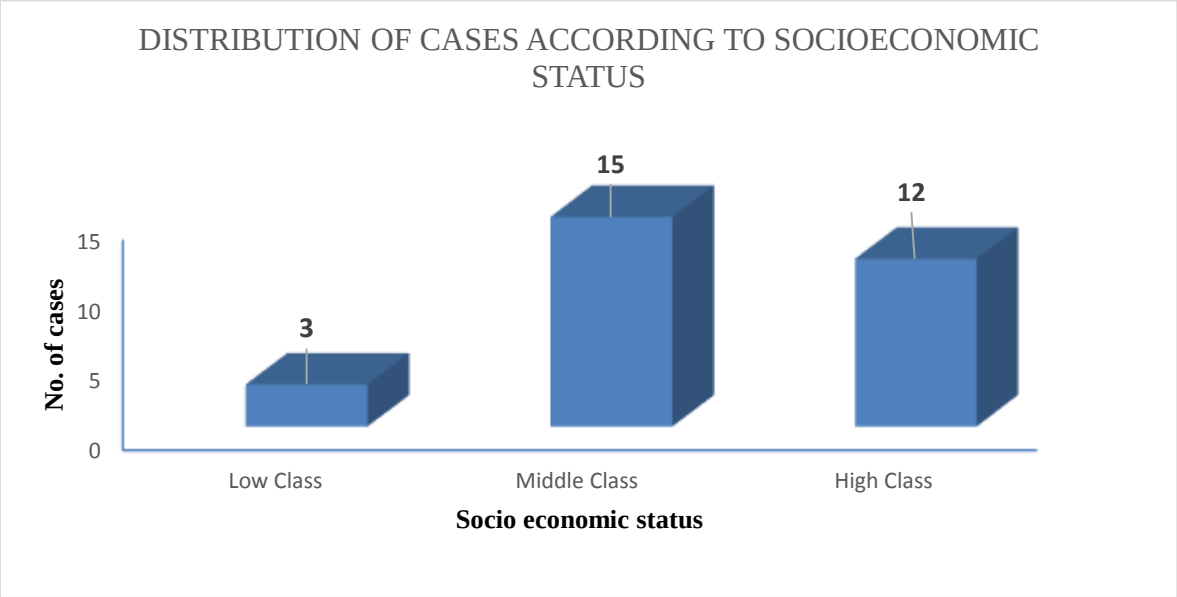
Out of 30 cases, 25 belong to rural area and 5 belong to urban area.

Distribution of cases according to Socio Economic Status

Table. 7 Distribution of cases according to Socio Economic Status

SL.NO	STATUS	NO. OF CASES	PERCENTAGE
1	Low	3	10%
2	Middle	15	50%
3	High	12	40%

Figure No:10 Distribution of cases according to Socio Economic Status



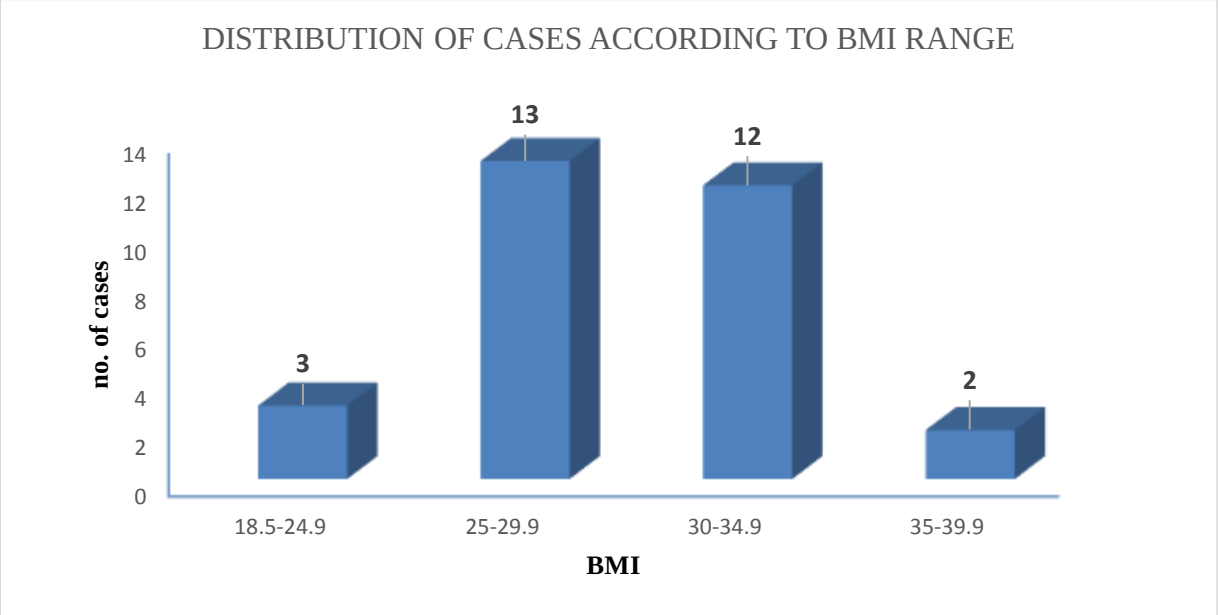
In the study 50% of the individuals with pre-diabetes come under middle class, 40% are high class individuals and the remaining 10% come under low socio economic status.

Distribution of cases according to changes in BMI

Table.8 Distribution of cases according to changes in BMI

SL.NO	BMI RANGE	NO. OF CASES	PERCENTAGE
1	18.5-24.9	3	10%
2	25-29.9	13	43.33%
3	30-34.9	12	40%
4	35-39.9	2	6.67%

Figure No:11 Distribution of cases according to changes in BMI



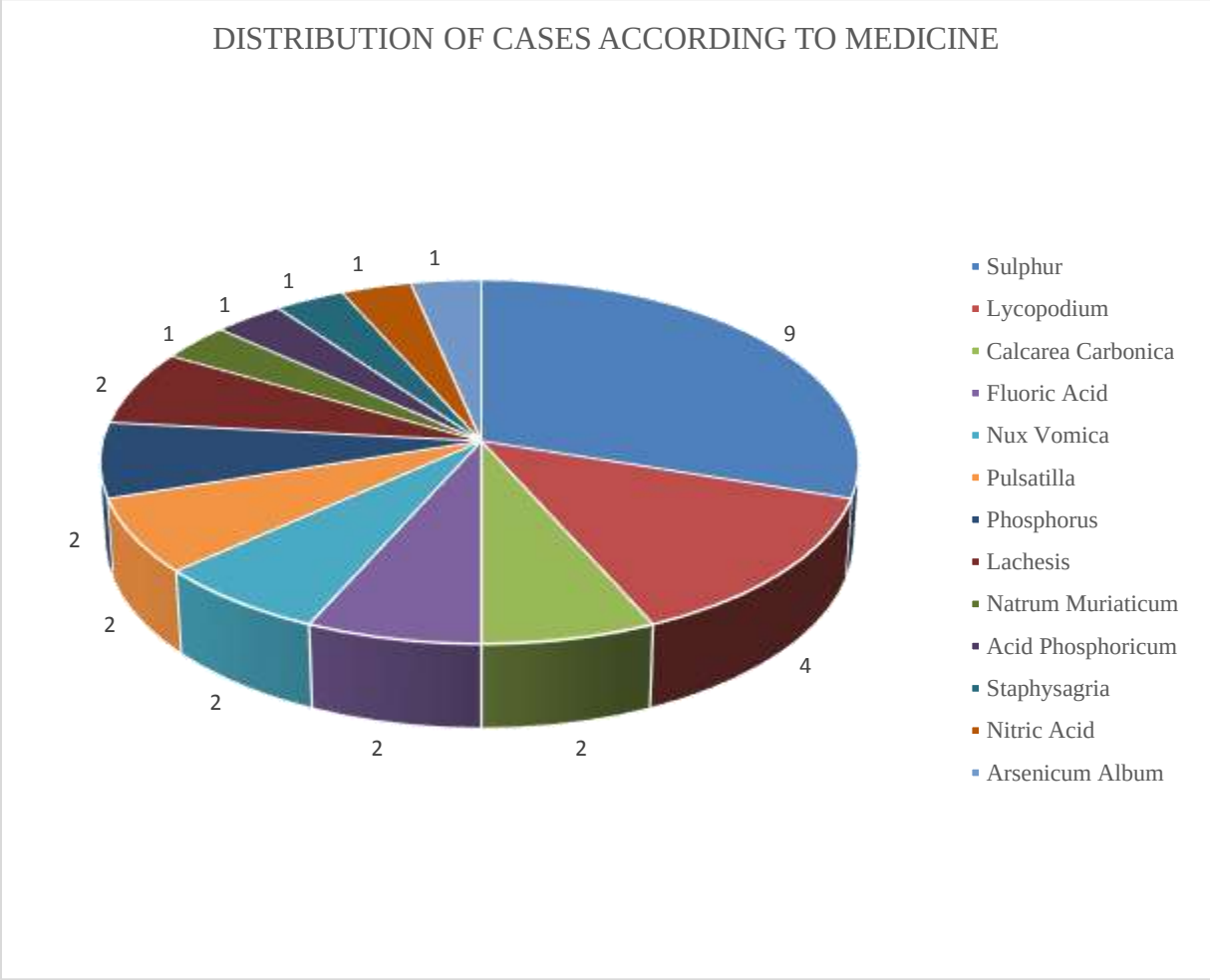
In this study of 30 cases about 13 patients (43.33%) were found to be over weight, 12 patients (40%) were obese, 2patients (6.67%) were severely obese and 3 patients (10%) were of normal weight.

Distribution of cases according to changes in BMI

Table.9 Distribution of cases according to Medicine

SL.NO	MEDICINE	NO. OF CASES	PERCENTAGE
1	Sulphur	9	30%
2	Lycopodium	4	13.33%
3	Calcarea Carbonica	2	6.67%
4	Fluoric Acid	2	6.67%
5	Nux Vomica	2	6.67%
6	Pulsatilla	2	6.67%
7	Phosphorus	2	6.67%
8	Lachesis	2	6.67%
9	Natrum Muriaticum	1	3.33%
10	Acid Phosphoricum	1	3.33%
11	Staphysagria	1	3.33%
12	Nitric Acid	1	3.33%
13	Arsenicum Album	1	3.33%

Figure No:12 Distribution of cases according to Medicine



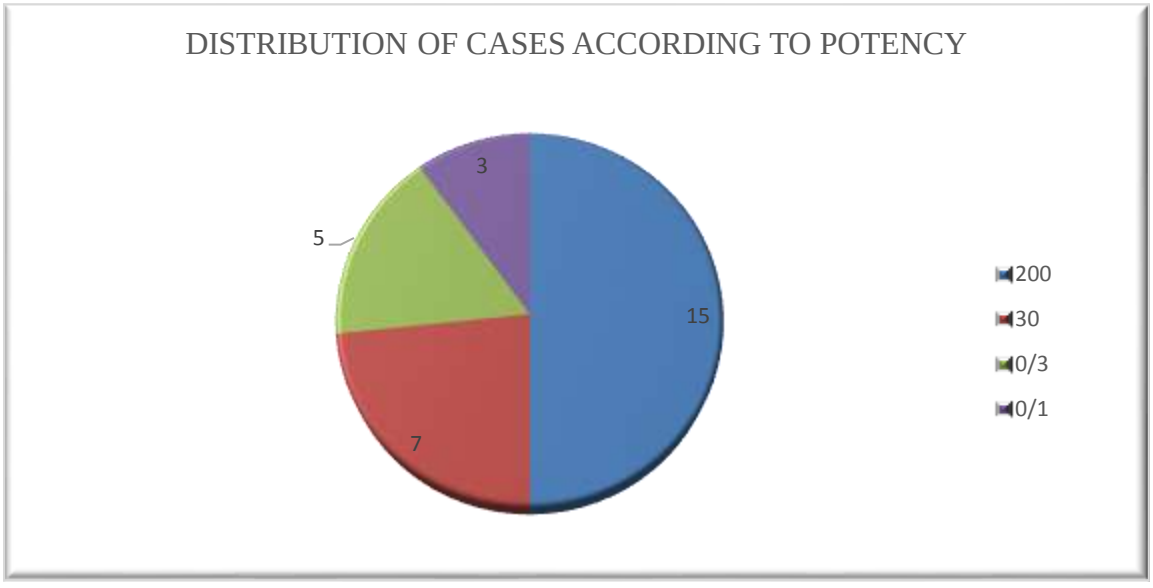
As shown in the above data, it is evident that Sulphur ranges the highest position(9 patients), followed by Lycopodium (4 patients), then Calcarea carb, Flouric acid, Nux vomica, Pulsatilla, Phosphorus and Lachesis came in the next postion (2 patients each); Natrum Muriaticum , Acid Phosphoricum , Staphysagria, Nitric Acid and Arsenicum Album in the last position. (1 patient each)

Distribution of cases according to Potency

Table.10 Distribution of cases according to Potency

SL.NO	POTENCY	NO. OF CASES	PERCENTAGE
1	200	15	50%
2	30	7	23.33%
3	0/3	5	16.67%
4	0/1	3	10%

Figure No:13 Distribution of cases according to Potency



Out of 30 cases 15 patients were given with 200th potency, 7 patients were given with 30th potency, 5 were given with 0/3 potency and 3 patients were given 0/1 potency.

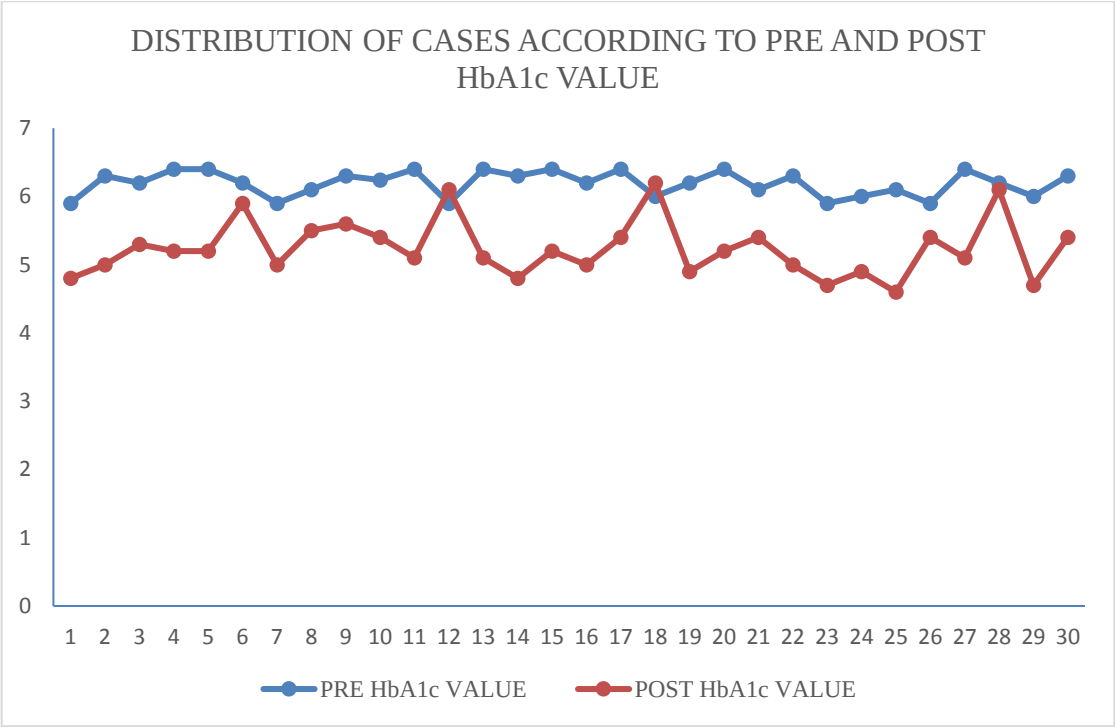
Distribution of cases according to pre and post HbA_{1c} values

Table. 11 Distribution of cases according to pre and post HbA_{1c} values

SL.NO	PRE HbA_{1c} VALUE	POST HbA_{1c} VALUE
1	5.9	4.8
2	6.3	5.0
3	6.2	5.3
4	6.4	5.2
5	6.4	5.2
6	6.2	5.9
7	5.9	5.0
8	6.1	5.5
9	6.3	5.6
10	6.24	5.4
11	6.4	5.1
12	5.9	6.1
13	6.4	5.1
14	6.3	4.8
15	6.4	5.2

16	6.2	5.0
17	6.4	5.4
18	6.0	6.2
19	6.2	4.9
20	6.4	5.2
21	6.1	5.4
22	6.3	5.0
23	5.9	4.7
24	6.0	4.9
25	6.1	4.6
26	5.9	5.4
27	6.4	5.1
28	6.2	6.6
29	6.0	4.7
30	6.3	5.4

Figure No:14 Distribution of cases according to Pre and Post HbA_{1c} values



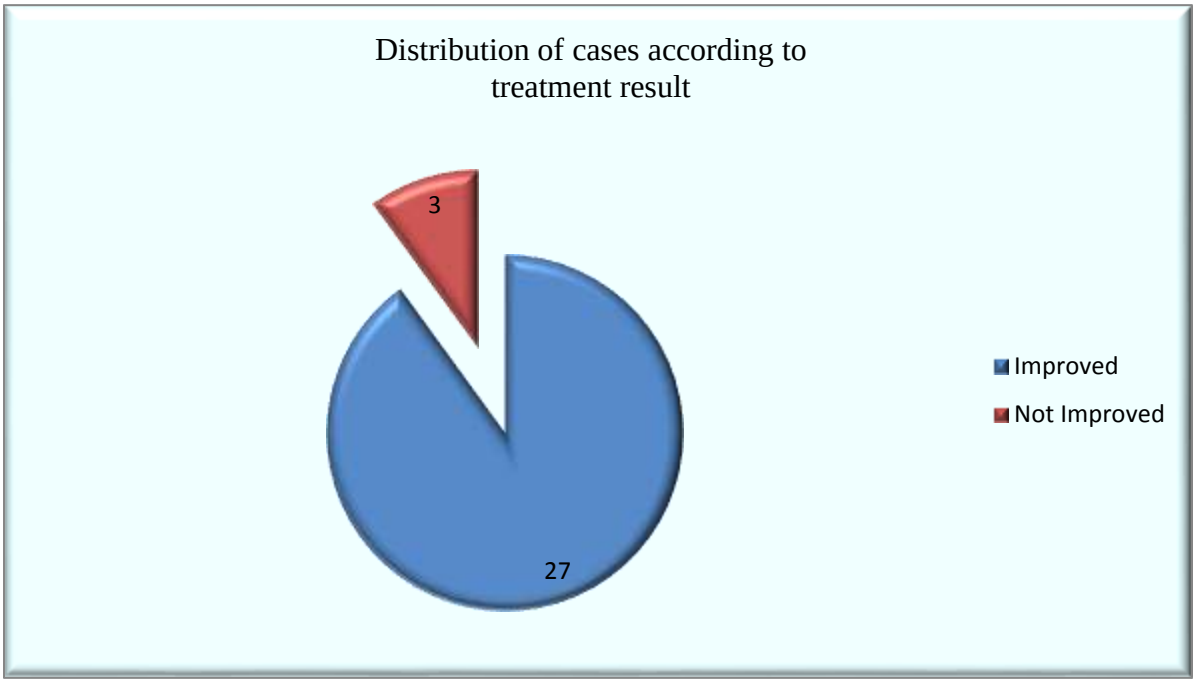
HbA_{1c} level 5.7% - 6.4% is considered to be pre-diabetic. In our study all the 30 cases were in this range of HbA_{1c} value before treatment and after the treatment most of the cases showed HbA_{1c} value below 5.7%, which shows that the patient has been checked from progressing to diabetes.

Distribution of cases according to treatment result

Table.12. Distribution of cases according to treatment result

SL.NO	RESULT	NO. OF CASES	PERCENTAGE
1	Improved	27	90.00%
2	Not Improved	3	10.00%

Figure No:15 Distribution of cases according to treatment result



Out of 30 cases, 27 cases showed lowering of HbA_{1c} value from the range of pre-diabetes and 3 cases did not show any improvement.

5.1 STATISTICAL ANALYSIS

Table 13 Hypothesis testing for HbA_{1c} levels

SL.NO	X	Y	d=X-Y	$d-\bar{d}$	$(d-\bar{d})^2$
1	5.9	4.8	1.1	0.149	0.022201
2	6.3	5	1.3	0.349	0.121801
3	6.2	5.3	0.9	-0.051	0.002601
4	6.4	5.2	1.2	0.249	0.062001
5	6.4	5.2	1.2	0.249	0.062001
6	6.2	5.9	0.3	-0.651	0.423801
7	5.9	5	0.9	-0.051	0.002601
8	6.1	5.5	0.6	-0.351	0.123201
9	6.3	5.6	0.7	-0.251	0.063001
10	6.24	5.4	0.84	-0.111	0.012321
11	6.4	5.1	1.3	0.349	0.121801
12	5.9	6.1	-0.2	-1.151	1.324801
13	6.4	5.1	1.3	0.349	0.121801
14	6.3	4.8	1.5	0.549	0.301401
15	6.4	5.2	1.2	0.249	0.062001
16	6.2	5	1.2	0.249	0.062001
17	6.4	5.4	1	0.049	0.002401
18	6.0	6.2	-0.2	-1.151	1.324801
19	6.2	4.9	1.3	0.349	0.121801
20	6.4	5.2	1.2	0.249	0.062001

21	6.1	5.4	0.7	-0.251	0.063001
22	6.3	5	1.3	0.349	0.121801
23	5.9	4.7	1.2	0.249	0.062001
24	6.0	4.9	1.1	0.149	0.022201
25	6.1	4.6	1.5	0.549	0.301401
26	5.9	5.4	0.5	-0.451	0.203401
27	6.4	5.1	1.3	0.349	0.121801
28	6.2	6.1	0.1	-0.851	0.724201
29	6.0	4.7	1.3	0.349	0.121801
30	6.3	5.4	0.9	-0.051	0.002601
Total	$\sum d = 28.54$		$\sum(d-\bar{d})^2 =$ 6.14455		

X= Score before treatment D= Mean difference Y= Score after treatment

A. Question to be answered:

Is there any difference between HbA_{1c} before and after Homoeopathic treatment?

B. Null Hypothesis:

There is no difference between HbA_{1c} before and after Homoeopathic treatment.

C. Standard error of the mean differences:

The mean of the differences, $\bar{d} = \Sigma d/n$

[Where $\Sigma d = 28.54$, $n = 30$]

$= 28.54/30$

$= 0.951$

The estimate of population standard deviation is given by,

$SD = \sqrt{\Sigma (d-\bar{d})^2/(n-1)}$

[Where $\Sigma (d-\bar{d})^2 = 6.14455$, $n = 30$]

$= \sqrt{6.14455/29}$

$= 0.4603$

Standard error (S.E) = SD / $\sqrt{n}$

$= 0.4603/ \sqrt{30}$

$= 0.0840$

D. The test statistics is Paired t:

Critical ratio = $t = \frac{\bar{d}}{SD/\sqrt{n}}$

$= 0.951 / 0.0840$

$= 11.321$

t-Test: Paired two sample for Means		
	Before	After
Mean	6.191333333	5.24
Variance	0.033425747	0.174896552
Pearson Correlation		-0.023271293
Df		29
t Stat		11.32002581
P(T<=t) one-tail		1.8435E-12
t Critical one-tail		1.699127027
P(T<=t) two-tail		3.687E-12
t Critical two-tail		2.045229642

E. Comparison with tabled value:

The critical ratio t follows a distribution with n-1 degrees of freedom. The tabled value at 5 % significance level is 2.045 and 1% level is 2.756 for 29 degrees of freedom. Since the calculated value 11.321 is greater than the tabled value at 5% and 1% significance level. Thus the null hypothesis is rejected.

F. Inference:

This study shows significant reduction in the HbA_{1c} levels after Homoeopathic treatment. Therefore, this study shows that Homoeopathic constitutional treatment can revert back pre-diabetes very effectively.

6.0 DISCUSSION

Pre-diabetes is a stage between normal and diabetes stage. It is an alarming sign for upcoming diabetes or a chance to change a person's future. It can take a long time to transform finally as diabetes. This study aim to check the progress of pre-diabetes to diabetes. In this study, it is observed that most of the individuals with pre-diabetes belong to the age group of 50-55 years. This can be because of the age related changes that can happen to the body and can also be due to their physical inactivity. This study reveals that more number of males are prone to this intermediate hyperglycemic state than women. Sedentary lifestyle, lack of physical activity, smoking, alcoholism and their dietary patterns can be the most probable causes why men being more affected. It has been observed that housewives are more affected with pre-diabetes than any other occupations. The main reason for this can be, even though they have ample amount of work at home but they may have irregular pattern of physical activity. Diabetes is an inherited disorder. Patients with a family history are most likely to be affected with pre-diabetes and diabetes.[7] Through this study I observed that about 28 cases, had a strong family history of diabetes. As our centre of study is a rural area most of the cases included in the study were from rural areas. Most of the pre-diabetic individuals belong to middle class socioeconomic status. Study reveals that people in the range of BMI: 25-29.9, over weight are more affected. Most of the patients did not show any clinical symptoms and the patients were selected based on their physique, family history, occupation and habits. Sulphur was the medicine which gave the highest number of results, followed by Lycopodium in the second position. 200^{th} potency was found effective in most of the cases. Pre-diabetes is an intermediate hyperglycemic state, which if left unmanaged will progress to type-2 diabetes and also studies reveal that a greater percentage of the pre-

diabetic individuals are prone to develop cardiovascular diseases.[29] So it is better to check the progression of pre-diabetes to diabetes ie. to revert back pre-diabetes. For this intervention is made into the lifestyle and dietary patterns of the affected individuals. Along with this Homoeopathic constitutional approach of the patient will also help to attain the goal. In my study of 30 cases, about 27 cases responded well to our treatment and the HbA_{1c} value came down below 5.7%. So it suggests that Homoeopathy is effective in preventing the progression to diabetes through constitutional treatment which is a unique characteristic of Homoeopathy.

6.1 LIMITATIONS

1. Number of samples used in the study is very small. Therefore generalization of the result and inferences of the study need to be done cautiously.
2. Selection of the cases were very much difficult since many of the cases were irregular during follow-ups and some of them even dropped out.
3. There was no control group in this study for comparison.
4. In some cases certain information were lacking and the study was based on available data.
5. It felt difficulty in advising the patients to get the HbA_{1c} tested as it is an expensive test.

6.2. RECOMMENDATIONS

1. Bigger sample size with extended time of research would provide better result.
2. It will be always scientific if control (placebo) group would have been kept simultaneously to verify the effectiveness of the treatment.
3. Research should also aim to address glycaemic transitions, in relation to the overweight or obesity transition, with a lengthy follow-up time, so as to inform optimal clinical management of the condition.

7.0 CONCLUSION

This study, titled, "A CLINICAL STUDY ON THE EFFECTIVENESS OF CONSTITUTIONAL TREATMENT IN THE PROGNOSIS OF PRE-DIABETES BASED ON GLYCATED HEMOGLOBIN" was conducted in Sarada Krishna Homoeopathic Medical College & Hospital with a sample of 30 cases. HbA_{1c} values before and after the treatment were analysed.

The study result showed that maximum number of patients in the age group of 50-55 years were affected with pre-diabetes. Males are more affected than females. Of the affected females most of them were housewives. Out of 30 cases, about 28 patients had a family history of diabetes. Majority of the individuals belong to rural area. Most of the individuals in the study belonged to middle class socio economic status. BMI of 13 cases in the study were in the over weight category. Sulphur was the most indicated remedy followed by Lycopodium in second position. 200^{th} potency was used in most of the cases. In this study of 30 cases, about 27 cases showed an improvement in HbA_{1c} value, after the treatment the HbA_{1c} value was below 5.7%. The statistical analysis for testing the significance of the study by 't' test showed that Homoeopathic treatment had a role in reducing glycated hemoglobin in Pre-diabetes and thereby to check the progression of pre-diabetes to diabetes.

8.0 SUMMARY

Present study includes a sample of 30 patients diagnosed to pre-diabetes and in each case HbA_{1c} value were estimated for a period of every three months. Maximum number of persons with pre-diabetes fall under the age group of 50-55 years, about 13 cases; 9 persons come under the age group of 44-49, 3 come under the age group of 38-43; 3 people come in the age group 32-37; 2 come under the age group of 26-31 and none of them fall under the age group of 20-25 years. Study reveals that males are more affected than females. Of the affected females most of them were housewives, 4 were teachers; 4 were businessmen; 3 coolies; 2 drivers; 2 religious persons; 2 Govt. Employees and auditor, Army officer, Security Gaurd, Carpenter, Mechanical Engineer and Bank employee were 1 in number each. Out of 30 patients, about 28 of them had a family history of Diabetes mellitus, 1 with a family history of hypertension and 1 with no family history. Out of 30 cases,25 belong to rural area and 5 belong to urban area. In the study 50% of the individuals with pre-diabetes come under middle class, 40% are high class individuals and the remaining 10% come under low socio economic status. About 13 patients (43.33%) were found to be over weight, 12 patients (40%) were obese, 2patients (6.67%) were severely obese and 3 patients (10%) were of normal weight.As shown in the studies, it is evident that SULPHUR ranges the highest position(9 patients), followed by LYCOPODIUM (4 patients), then CALCAREA CARB, FLOURIC ACID, NUX VOMICA, PULSATILLA, PHOSPHORUS AND LACHESIS came in the next postion (2 patients each); NATRUM MURIATICUM , ACID PHOSPHORICUM , STAPHYSAGRIA, NITRIC ACID and ARSENICUM ALBUM in the last position. (1 patient each). Out of 30 cases 15 patients were given with 200^{th} potency, 7 patients were given with 30^{th} potency, 5 were given with 0/3 potency and 3 patients were given 0/1

potency.27 cases showed an improvement with a reduction in HbA_{1c} value, below 5.7%, after the administration of our medicine.

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APPENDIX I

GLOSSARY

1	APHORISM	It is a terse saying, expressing a general truth, principle or exact observation, and spoken or written in a laconic and memorable form. Aphorism literally means a “distinction” or “definition”
2	POTENCY	The power is derived by the grades of medicinal power as developed by the rocess of dynamization. Potency means dilution of energy.
3	MIASM	A noxious influence, Miasm is defined by Hahnemann is the infectious principle, or virus, which, when taken into the organism, may set up a specific disease.
4	CONSTITUTION	It is the genotypic inheritance of an individual, the physical make up of his body, including its functional ability, metabolic activity, reaction to stimuli and resistance to infection.
5	CONSTITUTIONAL TREATMENT	Method of therapeutics unique to Homoeopathy. Constitutional medicine is capable of correcting the inherent and acquired defects in the personality.
6	INTER-CURRENT REMEDY	It can be used as a second prescription in some conditions. Some patient’s condition refuses to progress, which is termed as blockage. To remove this blockage an intercurrent remedy can be used as a second prescription.
7	DIABETES MELLITUS	It is a chronic metabolic disorder characterized by hyperglycemia with or without glycosuria, resulting from an absolute or relative deficiency of insulin.

APPENDIX II

'Case Records Are Our Valuable Asset' **CONFIDENTIAL**

SARADA KRISHNA

HOMOEOPATHIC MEDICAL COLLEGE HOSPITAL

KULASEKHARAM, KANNIYAKUMARI DIST, TAMIL NADU- 629 161

CHRONIC CASE RECORD

Date: …….. Unit…….. Regn. No…….

---

1. PERSONAL DATA

Name of Patient:……

Age :…….. yrs Sex : M/F/T Religion :…… Nationality :……

Name of Father / Spouse / Guardian / son / Daughter ……

Marital status : Single / Married . Widow (er) / Divorcee / Live-relation

Occupation :……..... Income per capita :……

Family size (members living together) :……

Diet : Veg. / Non veg. / Mixed

Address :……...

……..

Phone (Office) ……..… Residence ……

Mobile …… e-mail ……...

Referred to by:…….

FINAL DIAGNOSIS :

Homoeopathic	
Disease	

RESULT:	Cured	Relieved	Referred	Otherwise	Expired

Attending Physician …….....

2. Initial presentation of illness

PATIENT'S NARRATION (In the very expression used by him / her)	PHYSICIAN'S INTERROGATION (Details regarding symptoms narrated)	PHYSICIAN'S OBSERVATON

3. Presenting Complaint (s)

(patient's narration of ailments chronologically with duration and intensity)

Location (tissues, organs, systems extension & duration direction & frequency)	Sensation & Pathology	Modalities (>,<) & A/F (=)	Concomitants, if any
A. Chief Complaints(s) B. Associated complaints(s) (In chronological order with duration)			

4. H/o Presenting Illness :

(origin, duration and progression of each symptom in chronological order along with its mode of onset, probable cause (s), details of treatment and their outcome

5. H/o Previous Illness

No.	Age/Year	Illness, trauma, fright, burns(s), drug allergy(ies), operation(s), exposure(s), inoculation, vaccination(s), serum, steroids, hormone therapy, antibiotics, analgesics, etc	Treatment adopted	Outcome

6. **H/o FAMILY ILLNESS**

7. PERSONAL HISTORY:

A. LIFE SITUATION

Place of birth :
Religion :
Education : Occupation :
Socio-economic status :
Nutritional status :
Marital status :
Family status :

B. HABTS & HOBBIES:

Food :
Addictions :
Sleep :
Artistic :
Games / Sports :

C. DOMESTIC RELATIONS:

With family members :
With other relatives :
With neighbours / friends / colleagues :

D. SEXUAL RELATIONS:

Pre-marital:
Marital:
Extra Marital:

8. LIFE SPACE INVESTIGATIONS (as perceived by the 'Interrogator/ Physician)

(birth and early development (milestone), behaviour during childhood, education, adolescence & psychosexual history, occupational history, mental history, children, geriatrics history & travel history)

9. GYNAECOLOGICAL HISTORY

A. Menses

B. Previous History

C. Climacteric

D. Abnormal Vaginal Discharges

E. H/o gynaecological surgeries : Yes/No
(If yes state the reason)

10. OBSTETRICAL HISTORY

A. Previous Pregnancies including abortion:

B. Contraceptive method(s) adopted:

C. Present Pregnancy:

D. Physical Examination – Gynaecological / Obstetrical

11. GENERAL SYMPTOMS

A. Physicals

i. Functional

Appetite:

Thirst:

Sleep:

ii. Eliminations

Stool:

Urine:

Sweat:

iii. Reactions to

iv. Constitutional

B. Mental General

i. Will & emotions including motivation

ii. Understanding and intellect

iii. Memory

12. PHYSICAL EXAMINATION

A. General Examination

- Conscious/unconscious
- General appearance
- General built
- Ht : cm Wt : Kg BMI :
- Anaemia
- Jaundice
- Cyanosis
- Oedema
- Skin
- Nails
- Gait
- Lymphadenopathy
- Blood pressure Pulse
- Temp Resp. rate
- Others

B. Systemic Examination

i. Respiratory system

ii. Cardiovascular system

iii. Gastro Intestinal system

iv. Urogenital system

v. Skin and Glands

vi. Musculo-skeletal system

vii. Central Nervous system

viii. Endocrine

ix. Eye & ENT

x. Others

C. **REGIONALS**

13. LABORATORY INVESTIGATIONS & FINDING AND SURGICAL INVESTIGATIONS

(urine, stool, blood, sputum, imaging, ECG, and other investigations)

14. DIAGNOSIS

A. Provisional Diagnosis

B. Differential Diagnosis

C. **Final Diagnosis** (Disease)

15. DATA PROCESSING

A. Analysis of case

Basic / Common / Pathognomonic Symptoms	Determinative / Uncommon / Non-pathognomonic Symptoms

B. Evaluation of Symptoms

C. Miasmatic Analysis

PSORA	SYCOTIC	SYPHILIS

Miasmatic Diagnosis :	

D. Totality of Symptoms

E. **Homoeopathic Diagnosis** (Hahnemannian Classification)

16. SELECTION OF MEDICINE

A. Non Repertorial Approach

B. Repertorial Approach

C. SELECTION OF POTENCY AND DOSE

D. PRESCRIPTION

3. GENERAL MANAGEMENT INCLUDING AUXILLARU MEASURES

A. General/Surgical/Accessory

B. Restrictions (diet, regimen etc)

Disease	Medicinal

PROGRESS & FOLLOW UP

Date	Symptom(s) changes	Inference	Prescription

APPENDIX III

FORM – 4: CONSENT FORM (A)

INFORMATION FOR PARTICIPANTS OF THE STUDY

Title of my study is "A CLINICAL STUDY ON THE EFFECTIVENESS OF CONSTITUTIONAL TREATMENT IN THE PROGNOSIS OF PRE-DIABETES BASED ON GLYCATED HEMOGLOBIN". The purpose of my study is (1) to study the improvement of the patient based on HbA_{1c} levels in persons with pre-diabetes (2) to study about the history and clinical presentation of individuals diagnosed with pre-diabetes. Duration of my study is from July 2017 – January 2019.

The procedures include selection of 30 cases of patients with pre-diabetes from OPD, IPD and from peripheral centers of Sarada Krishna Homoeopathic Medical College Hospital. The case will be analysed and evaluated. It is repertorised and a well selected remedy will be prescribed after referring the Materia Medica. The repetition of doses will be done based on the Homoeopathic principles. Assessment will be done once in a week or two weeks and changes will be recorded. The HbA_{1c} value will be assessed before starting the treatment and the assessment is done 3 months later.

The benefits to the subject or others, reasonably expected from research are (1) The participants are investigated to find out whether he/she is having pre-diabetes. (2) If the participant is identified to have pre-diabetes he/she will be given awareness about the risk factors of Diabetes by which they can reduce/ control the progression of their disease. (3) Thus study is a benefit not only to the participant but also to the society as a whole. The records are maintained highly confidential. Only the

investigator has the access to the subject's medical records. Participant's identity will never be disclosed at any time, during or after the study period or during publication of the research. Securely store data documents in locked locations and Encrypt identifiable computerized data. All information revealed by patient will be kept as strictly confidential. Free treatment for research related injury is guaranteed. Compensation of the participants not only disability or death resulting from such injury but also for unforeseeable risks is provided, in case situation arises.

Contact for trial related queries, rights of subjects and in the event of any injury.

INVESTIGATOR

Dr. Mahima. S, P.G. Scholar,

Department of Practice of Medicine,

Sarada Krishna Homoeopathic Medical College,

Kulasekharam, Mobile no: 8089817909.

GUIDE

Dr. T. Ajayan

Professor & Head

Department of Practice of Medicine,

Sarada Krishna Homoeopathic Medical College,

Kulasekharam, Mobile no: 9442365199.

There will not be any anticipated prorated payment to the subject for participating in the trial. The responsibilities of the participants in the trial are they must disclose all about the complaints. Participants must strictly stick on to the scheduled Diet, Regimen and Medicine.

The participation is voluntary, that the subject can withdraw from the study at any time and that refusal to participate will not involve any penalty or loss of benefits to which the subject is otherwise entitled.

FORM– 4 A

CONSENT FORM (B)

Informed Consent form to participate in a clinical trial

Study Title: "A CLINICAL STUDY ON THE EFFECTIVENESS OF CONSTITUTIONAL TREATMENT IN THE PROGNOSIS OF PRE-DIABETES BASED ON GLYCATED HEMOGLOBIN"

Study Number: Subject's Initials_____ Subject's Name _____

Date of birth/Age: _____

Please initial

Box (Subject)

i. I confirm that I have read and understood the information sheet dated July 2017 for the above study and have had the opportunity to ask question. [ ]

ii. I understood that my participation in the study is voluntary and that I am free to withdraw at any time without giving any reason. Without my medical [ ] care or legal rights being affected.

iii. I understand that the sponsor of the clinical trial, others working on the sponsor's [ ] behalf the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and

further research that may be conducted in relation to it, even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published.

iv. I agree not to restrict the use of any data or result that arise from this study [ ]

provided such a use only for scientific purpose(s)

v. I agree to take part in the above study.

Signature (or Thumb impression of the subject/legally acceptable)

Representative: _____

Date _____/_____/_____

Signatory's Name: _____

Signature of the Investigator: _____

Study Investigator's Name: Dr. Mahima. S

Signature of the Witness_____ Date: _____/_____/_____

Signature of the Witness_____ Date: _____/_____/_____

APPENDIX IV

CASE

Name of the patient: Mrs. M

Age: 27 yrs

Sex: Female

Religion: Hindu

Occupation: Clerk

Address: Moovattumugham

Date of case taking: 14th Dec 2017

OP NO.:9321/18

Presenting complaint

Location	**Sensation**	**Modality**	**Associated symptoms**
Head – frontal region Since 2 years	Pain	< stooping < morning < cold season < coughing on > Hard pressure > steam inhalation	Heaviness of eyelids
Back – cervical region Since 1 year	Aching pain	< physical exertion > Lying on back >Warm application < prolonged sitting < cold season	

History of present illness

Patient complains of frontal headache since 2 years which is mostly occurring during cold season following rhinitis. The complaint get worsened while stooping, in the

morning and on coughing and is better by hard pressure and steam inhalation. She also have heaviness of eyelids along with the complaint. She does not have nausea or vomiting, dimness of vision or vertigo associated with the complaint.

History of previous illness

Childhood – Chickenpox – Traditional Medicine - Relieved

Family history

Father and mother: Diabetic

Personal history

Place of birth : Moovattumugham

Religion : Hindu

Education : B. Com

Economic Status : High

Marrital status : Married

Family status : High

Occupation : Clerk

Habits and hobbies

Food : Non-veg

Addictions : Nil

Sleep : Good

Domestic relations

With family members : Good

With other relatives : Good

With neighbours/ Friends/ Colleagues : Good

Sexual relation

Premarital : Nil

Marital : Good

Extra marital : Nil

Life space investigation

Patient was born in a moderate family at Moovattumugham. Her father was a business man and her mother was a housewife. She have one brother and a sister. She studied upto B.Com and got employed as a Clerk in SBI at the age of 25 yrs. She got married at the age of 26 yrs and is leading a happy and satisfactory life. She is blessed with a son. Her father died 2 years back and she is having grief for that incident.

Psychic features

Appearance :Jovial, interacts easily,< contradiction

Reaction to :desire company, music, loquacious, talks continuously

Physical features

Appearance : healthy, well built

Stature : good stature

Complexion : earthy

Gait : steady

Clean/Unclean : clean

Generals

Appetite : normal

Thirst : normal

Sleep : good

Stool : regular

Urine : normal

Sweat : normal

Reaction to:

Desire : cold season

Desire : fanning

Desire : spicy food

Desire : warm food

Thermal : hot

Physical examination

General:

Jaundice :not icteric

Anaemia :no pallor

Oedema :nil

Cyanosis :nil

Clubbing :nil

Lymphadenopathy :nil

Discolouration	:nil
Skin eruption	:nil
Height	:150 cm
Weight	: 66 kg
BMI	:29
Pulse	:72 bpm
B.P	:110/70 mmHg
Respiratory rate	: 18/min
Temperature	: 98.6^0 F

Systemic examination

Examination of upper respiratory tract:

Inspection: No DNS, no nasal polyp, hypertrophied turbinate present on both nostrils.

Examination of Paranasal sinuses

Palpation: Tenderness present on the frontal region

Examination of cervical spine

Inspection: No spinal deformity, no swelling, no discolouration

Palpation: no tenderness, no local warmth

Movements: Flexion, extension, lateral flexion and lateral rotation are possible but painful.

Regionals

Tongue: white coated

Lab. Investigation

HbA_{1c} : 6.3%

Menstrual history

LMP : 7-12-2017

FMP : 14 yrs

Cycle : regular

Duration : 5 days

Quantity : normal, 4 regular pads/day

Consistency and clots : clotted

Colour and odour : bright red

Stains and acridity : no stains and acridity

Obstetrical history

G_1 P_1 A_0 D_0 L_1

Provisional diagnosis

Sinusitis, Cervical spondylosis

Differential diagnosis

Tension Headache, Cervical rib

Analysis of the case

Common symptom	Uncommon symptom
Head – frontal region - pain < stooping < morning	Jovial, interacts easily,< contradiction desire company, music, loquacious, talks

< cold season < coughing on > Hard pressure > steam inhalation Back – cervical region – aching pain < physical exertion > Lying on back >Warm application < prolonged sitting < cold season	continuously Desire : cold season Desire : fanning Desire : spicy food Desire : warm food Thermal : hot

Evaluation of symptoms

Mental generals

Jovial, interacts easily,< contradiction

desire company, music, loquacious, talks

Physical generals

Desire : cold season

Desire : fanning

Desire : spicy food

Desire : warm food

Thermal : hot

Particulars

Head – frontal region - pain

< stooping

< morning

< cold season

< coughing on

> Hard pressure

> steam inhalation

Back – cervical region – aching pain

< physical exertion

> Lying on back

>Warm application

< prolonged sitting

Miasmatic expression

Psora	Sycosis	Syphilis
Frontal headache	Cervical region	Desire fanning
<morning	<physical exertion	Desire cold season
>warm application	<cold in general	
Desire spicy food	>pressure	
Desire warm food	>lying down	
	Desire company	

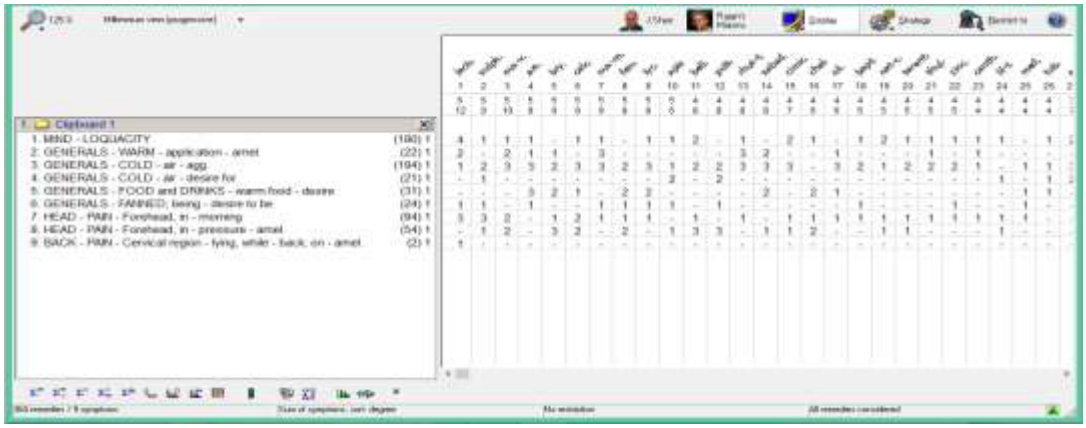
Prominent miasm: Psora Sycosis

Totality of symptoms

- Loquacious
- > warm application

- < cold season
- Desire fanning
- Desire warm food
- Frontal headache < morning, >pressure
- Cervical region pain >lying back on

Repertorial result



Medicinal Management

R_x LACHESIS 200/1D

DATE	FOLLOW UP	MEDICINE PRESCRIBED
28-12-2017	Headache – frontal region better than before but present occasionally Cervical region pain persist as same < prolonged sitting	**R_x SAC LAC/1 DOSE**

11-01-2018 25-01-2018 08-02-2018	Generals: Good BP: 100/72 mmHg Frontal headache feels better than Before Cervical region pain slightly better than before Generals: Thirst: decreased Others: good BP: 110/70 mm Hg Frontal headache occurred for once Cervical region pain slightly better than before but persist Generals: good BP: 110/80 mm Hg Frontal headache better Cervical region pain slightly better than before but persist	**R_x SAC LAC/1 DOSE** **R_x LACHESIS 200/1D** **R_x SAC LAC/1 DOSE**

	Generals: good	
22-2-2018	BP: 120/80 mm Hg	
	Frontal headache better Cervical region pain slightly better than before but persist Generals: good	**R_x SAC LAC/1 DOSE**
8-03-2018	BP: 100/70 mm Hg	
	Frontal headache better but occasionally present Cervical region pain slightly better than before but persist Generals: good	**R_x LACHESIS 200/1D**
22-03-2018	BP: 100/70 mm Hg	
	Frontal headache better than before Cervical region pain slightly better than before but persist Generals: good	**R_x SAC LAC/1 DOSE**
05-04-2018	BP: 110/70 mm Hg	

	Frontal headache better than before Cervical region pain slightly better than before but persist Generals: good BP: 120/70 mm Hg HbA_{1c} : 5.0%	**R_x SAC LAC/1 DOSE**

APPENDIX V

MASTER CHART

Sl No:	Op no:	Age	Sex	Occupation	Dwelling	Socio economic status	Family history	Diet	BMI	Medicine	Potency	HbA_{1c}		Result
												BT	AT	
1	11925/8	29 yrs	M	Teacher	Urban	High	Mother, Father: Diabetic	Non-veg	27	Phosphorus	200	5.9	4.8	Improved
2	9321/18	27 yrs	F	Clerk	Rural	High	Father, mother: diabetic	Non-veg	29	Lachesis	200	6.3	5.0	Improved
3	1951/18	50 yrs	M	Security gaurd	Rural	Middle	Father: diabetic	Non-veg	25	Nux vomica	30	6.2	5.3	Improved
4	3805/17	36 yrs	F	Carpenter	Rural	Middle	Mother, Brother: diabetic	Veg	32.8	Sulphur	0/3	6.4	5.2	Improved
5	2664/18	47 yrs	F	Housewife	Rural	Middle	Mother: hypertension	Non-veg	37	Sulphur	200	6.4	5.2	Improved
6	336/18	52 yrs	M	Business man	Rural	Middle	Father: diabetic	Non-veg	32	Sulphur	200	6.2	5.9	Improved
7	5994/17	46 yrs	M	Coolie	Rural	Low	nil	Non-veg	30	Calcarea carb	0/1	5.9	5.0	Improved
8	10230/17	55 yrs	M	Auditor	Urban	High	Father, Mother: diabetic	Non-veg	31	Lycopodium	0/3	6.1	5.5	Improved
9	711/18	42 yrs	M	Coolie	Rural	Low	Father: diabetic	Non-veg	23	Lycopodium	30	6.3	5.6	Improved
10	12646/8	52 yrs	M	Driver	Rural	Middle	Mother, Fther, Brother: diabetic	Non-veg	25	Fluoric acid	200	6.24	5.4	Improved
11	5775/17	53 yrs	M	Business man	Rural	High	Mother, father: diabetic	Non-veg	24.8	Flouric acid	30	6.4	5.1	Improved
12	9047/18	45 yrs	M	Driver	Rural	Middle	Father: diabetic	Non-veg	25	Lachesis	200	5.9	6.1	Not improved
13	5984/18	51 yrs	M	Mechanical	Rural	High	Mother,	Non-veg	22	Lycopodium	0/3	6.4	5.1	Improved

				engineer			Father: diabetic							
14	5696/18	48 yrs	F	House Wife	Rural	Middle	Father: Diabetic	Non-veg	37	Pulsatilla	30	6.3	4.8	Improved
15	5770/18	33 yrs	F	House Wife	Urban	High	Father, Mother, Brother: Diabetic	Non-Veg	33.4	Phosphorus	0/1	6.4	5.2	Improved
16	6518/17	49 yrs	M	Bank Employee	Rural	High	Mother, Sister: Diabetic	Non-Veg	27	Sulphur	0/1	6.2	5	Improved
17	1550/17	55 yrs	M	Business Man	Urban	High	Father: Diabetic	Non-Veg	28	Natrum mur	200	6.4	5.4	Improved
18	1879/18	55 yrs	M	Business Man	Rural	Middle	Father: Diabetic	Non-Veg	31	Acid Phos	30	6	6.2	Not Improved
19	10162/17	39 yrs	F	House Wife	Rural	Middle	Mother, Brother: Diabetic	Non-Veg	30	Calc Carb	200	6.2	4.9	Improved
20	4756/17	51 yrs	M	Religious Person	Rural	Middle	Father: Diabetic	Non-Veg	32	Pulsatilla	200	6.4	5.2	Improved
21	62/17	45 yrs	M	Coolie	Rural	Lower	Father: Diabetic	Non-Veg	28	Sulphur	30	6.1	5.4	Improved
22	8689/18	55 yrs	F	Religious Person	Rural	Middle	Mother : Diabetic	Non-Veg	30	Sulphur	0/3	6.3	5.0	Improved
23	8046/17	52 yrs	F	House Wife	Rural	High	Father: Diabetic	Veg	29	Sulphur	200	5.9	4.7	Improved
24	675/18	51 yrs	F	Teacher	Rural	Middle	Father, Mother: Diabetic	Non-Veg	32	Lycopodium	200	6	4.9	Improved
25	1686/18	48 yrs	M	Govt. Employee	Urban	High	Father: Diabetic	Non-Veg	28	Sulphur	200	6.1	4.6	Improved
26	6026/17	47 yrs	F	Teacher	Rural	High	Mother, Brother: Diabetic	Non-Veg	26	Staphysagria	200	5.9	5.4	Improved
27	6527/18	43 yrs	F	House Wife	Rural	Middle	Mother: Diabetic	Non-Veg	25	Nitric acid	30	6.4	5.1	Improved
28	4858/18	54 yrs	F	House Wife	Rural	Middle	Father, Mother, Sister:	Non-Veg	33	Nux vom	200	6.2	6.6	Not Improved

							Diabetic							
29	2176/18	36 yrs	M	Teacher	Rural	High	Mother, Uncle, Brother: Diabetic	Non-Veg	32	Sulphur	0/3	6	4.7	Improved
30	2187/18	48 yrs	M	Army	Rural	Middle	Father: Diabetic	Non-Veg	25	Ars alb	200	6.3	5.4	Improved